

Presentation
of The
Royal - And Other Awards.

VOL- 44

1874



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PRESENTATION

OF THE

ROYAL AND OTHER AWARDS.

(At the Anniversary Meeting, June 22nd, 1874.)

ROYAL MEDALS.

THE FOUNDER'S GOLD MEDAL for the promotion of Geographical Science and Discovery was awarded this year to Dr. Georg Schweinfürth, for his explorations in Africa during many years; for his determination of the south-western limits of the basin of the Nile, and discovery of the River Uelle, in a new region beyond those limits; and for his admirable work, 'The Heart of Africa,' in which he has recorded the valuable results of his travels. The VICTORIA, or PATRON'S GOLD MEDAL, was awarded to Colonel P. Egerton Warburton, for his successful journey across the previously unknown western interior of Australia, from Alice Springs, on the line of Overland Telegraph, to the west coast, near De Grey River.

In the absence of the medalists, His Excellency Count Münster, German Ambassador, attended to receive the medal on behalf of Dr. Schweinfürth, and J. Bateman, Esq., on behalf of Colonel Warburton.

Addressing Count Münster, the PRESIDENT said:—

"In handing this medal to your Excellency to be conveyed to your countryman, Dr. Georg Schweinfürth, who is expected soon to return from a new journey he has undertaken in the interior of Northern Africa, I have but little need to mention the services this distinguished traveller has rendered to Geographical Science—such the Council of this Society have felt it their duty to acknowledge. The work describing his journey, published by Schweinfürth, and translated into the English language, has been so widely read that few persons with any knowledge of the subject are ignorant of his name and the

and admire it. Trained by a previous experience of three years in African travel, in Nubia, Dr. Schweinfürth started on his longer journey in 1868, with the fixed purpose of exploring that portion of the region of the Upper Nile which is watered by the tributaries of the Bahr Ghazal, and which had been previously visited by Petherick, von Heuglin, Antinori, Piaggia, Mademoiselle Tinné, and others. Trusting himself, as a solitary European, in the hands of an armed party of ivory merchants, he penetrated with them to their most distant stations, beyond the country of the once mysterious Nyam-Nyams, and across the watershed of the Nile. Although unprovided with instruments for astronomical observations, he plotted his routes on the basis of calculated paces and compass bearings, and with such accuracy that he was enabled to furnish material for a good map of the whole country he traversed; an accuracy which he tested by a long journey undertaken for the sole purpose of verifying his work by connecting it with a fixed position on the route of Petherick. But it is not merely for his topographical labours that the Council deem him eminently worthy of the distinction of a Royal Medal. His book teems with observations on the physical geography, ethnology, climate, botany, and resources of that remote region; and so graphically has he portrayed its various aspects, that we seem, in his pages, to obtain a clear idea of the interior of Equatorial Africa.

"With these remarks permit me, your Excellency, to deliver this Medal into your hands."

His Excellency Count Münster briefly replied:—He felt proud and grateful that the Society had conferred the greatest honour in its power to bestow, on one of his countrymen, and as soon as he should learn the arrival of Dr. Schweinfürth from the new journey in Africa, which he had undertaken since the publication of the work alluded to by the President, he would lose no time in transmitting it into his hands. He (Count Münster) was gratified to think that his countrymen worked together with the Royal Geographical Society for the great objects of science and civilization, and was proud of the honour of himself belonging, as a member, to the Royal Geographical Society.

Next addressing Mr. J. Bateman, who attended to receive the Victoria or Patron's Medal on behalf of Colonel Egerton Warburton, now in Australia, the President thus spoke:—

"The Council of the Royal Geographical Society have decreed on"

of the Royal Medals of the year to your relative, Colonel Egerton Warburton, in testimony of their admiration of the ability and daring he has displayed in undertaking and carrying to a successful issue one of the most difficult and hazardous explorations of recent times, across a previously unknown part of Australia—a part which had baffled the attempts of several previous travellers. Starting from Alice's Springs, near Central Mount Stuart, on the line of Overland Telegraph, on the 15th of April, 1873, he reached, after eight months' march—the latter portion of which was through an arid region where they were supported by the meat of their slaughtered camels, and finally narrowly escaped death from starvation—the frontier settlements on the De Grey River at the end of December, and Roebourne, in Nickol Bay, early in last January. Thus nearly 1000 miles of entirely new country have been traversed, and although no detailed account of the Expedition has yet been received in this country, the Council have full confidence that a large amount of accurate geographical information will be added by Colonel Warburton, as the fruits of his Expedition, to the common stock of knowledge. During the twenty years he has been a resident in the colony he has been repeatedly engaged in the work of geographical exploration, and in the years 1865–1866 distinguished himself by his journeys in the basin of Lake Eyre, his Report of which, with a map, was published by the Colonial Government. Although so large a portion of the region traversed in his last Expedition proved so trying to the party and so destitute of resources, no part of it was utterly destitute of vegetation, and there can be no doubt that his journey will lead to important practical results. Indeed, his safe arrival in Adelaide was celebrated on the 16th of April last by a banquet, at which 220 gentlemen, representatives of all the chief interests in the community, attended to give an enthusiastic welcome to the successful explorer. I am happy to learn from Colonel Mant, that Colonel Warburton was engaged, when he last heard from him, in preparing his Journal, and that his son, who accompanied him in his journey, is constructing a map of the region traversed, both which will be sent to England for publication. In placing this Medal in your hands, for transmission to your relative, I trust that you will express to him the sympathy of myself and colleagues of the Council of this Society for the privations he has suffered, and our wishes for his future welfare."

Mr. BATEMAN, in acknowledging the gift, said that he regretted that Colonel Warburton could not himself be present to return

thanks. He was sure that if anything could repay his relative for the arduous journey he had performed, and the very great sufferings he had endured, it would be the honour that the Royal Geographical Society had conferred upon him. It was hard to realize that in the centre of Western Australia an unexplored district existed, as large in area as Spain and Portugal together. All the attempts which had hitherto been made to traverse it had failed, in consequence of the extreme aridity of the country. Governor Eyre, in his well-known journey, was obliged to travel along the coast and subsist on shell-fish; and of the fourteen persons who started in the expedition under Colonel Warburton, only two remained capable of doing their duty. All the hardships, however, which the leader had undergone would be richly atoned for by the Gold Medal of the Royal Geographical Society.

PUBLIC SCHOOLS PRIZE MEDALS.

Mr. FRANCIS GALTON, F.R.S., Chairman of the Public Schools Prizes Committee, introduced the subject of the awards of the year in the following words:—

“The Society will learn with pleasure that their offer of four medals for annual competition among all the boys of our great public schools has again produced gratifying results. No less than 15 great public schools have sent competitors, and the boys who come first in our list are adjudged by the examiners to have well deserved their honours. This is the sixth year of our examinations, and consequently 24 medals have been won since their commencement, which, together with the number of those ‘honourably mentioned,’ testifies to perhaps 100 public-schoolboys having been induced by us to make a serious and successful study of geography. The authorities of public schools are apt to complain of the difficulty of obtaining good teachers in natural science: we, at all events, are doing our part towards preparing material whence future teachers may be selected. We may also take credit to ourselves for having already raised the standard of geographical teaching in many schools. It has occurred more than once that candidates have been found ill prepared: we represented the defect to the head masters, who turned their attention to remedying it, and their boys in subsequent years have distinguished themselves. Lastly, we have had the continued good fortune to secure geographers of the highest rank for our examiners. This was a means we had in view from the

first, of improving the quality of geographical examinations and incidentally of geographical teaching."

The PRESIDENT then presented medals as follows :—

PHYSICAL GEOGRAPHY (Examiner, Professor A. C. RAMSAY, LL.D., &c.)

Gold Medal.—Louis Weston, City of London School.

Bronze Medal.—Francis Charles Montague, University College School.

POLITICAL GEOGRAPHY (Examiner, the Rev. Canon RAWLINSON, M.A.)

Gold Medal.—William Harry Turton, Clifton College, Bristol.

Bronze Medal.—Lionel Jacob, City of London School.

The Rev. Mr. Durham, of the City of London School, and Mr. W. W. Magee, of University College School, also attended.

The Hon. G. C. BRODRICK then announced that the special subject for the examination next year would be China; and, in doing so, he expressed a hope that the Society would be as fortunate as it had hitherto been in securing the services of eminent examiners in that subject. As Mr. Galton had said, that had been one of the objects the Society had had in view, and hitherto they had been very successful. In 1872, South America being the special subject, the services of Mr. Bates were secured, who has thrown so much light upon that region by his own researches. In 1873, the subject being Central Asia, Sir Henry Rawlinson was the examiner in Political Geography, and Dr. Hooker in Physical Geography. At the last examination, when the subject was the British Isles, Professor Ramsay was the examiner in Physical Geography. Of course, China could not be compared in historical interest with the British Isles, nor could the competing candidates next year have the advantage of such admirable text-books on physical and political geography as those which the candidates for the present year had had. At the same time the physical geography of China was of very great interest, and perhaps there was no country so important about which the general public knew so little. A popular impression still prevailed, though it certainly could not be shared by the Fellows of the Society, that China is not many times larger than Great Britain, but is most densely peopled; the fact really being that it is at least eighteen times as large as Great Britain, and is not so densely peopled as Great Britain. Yet China is, after all, but six weeks distant from England; and in these days, when a journey round the world by way of China can be accomplished in 90 days, it is not too much to hope that some of those who are led to study

the geography of that country for the purpose of next year's examinations, may hereafter visit it themselves. Those who competed for the prizes would not only find themselves amply rewarded by the interest of the subject itself, and by the commercial utility of geographical knowledge in these days, but also by its value in University examinations. A definite and honourable place had been assigned to geography in the new system of examinations of schools which had been established by the Universities; and the Council of the Society had lately, through their President, addressed a letter to the Vice-Chancellors of the Universities of Oxford and Cambridge, pointing out the claims of geographical science to due recognition in any future redistribution of University revenues, and suggesting that there ought to be a Professorship of geography in each University, and that it might even be possible to found travelling Fellowships for the encouragement of original research in geography.

At the conclusion of the President's Annual Address on the progress of Geography—

Sir H. RAWLINSON said he should be sorry for the meeting to separate without expressing, in a marked manner, their respect and gratitude to Sir Bartle Frere, on this the last occasion of his presiding over their proceedings. It was a matter of much regret to himself (Sir Henry), personally, as it must be to all the Fellows of the Society, that the Council had not been able to persuade Sir Bartle to retain, for a longer period, the office which he had so worthily filled during the past year. The report of the Council showed that during that year the Society had increased in a marked manner both in numbers and reputation; and for that exceptional prosperity they were no doubt greatly indebted to the high personal character of Sir Bartle Frere, united with his very special qualifications for the office. He had always been remarkable for combining those qualities of heart and head which enabled him to command the admiration and to enlist the sympathies of his fellow-men. Had he continued to fill the chair, undoubtedly the same prosperity would have attended the Society in the future. As his successor, he (Sir Henry) felt very much the increased responsibilities which devolved upon him. They could not always expect the same great accession of new members, nor that new objects of interest would command the public attention as did the last days of the heroic Livingstone; but no doubt questions of importance

would arise, and in devoting himself to the charge of the interests of the Society, he should take for his example the conduct and the labours of his predecessor.

Sir Henry then proposed a vote of thanks to the retiring Members of the Council, and to the Auditors. He would wish to include in this vote also the Staff, for he believed there was no Society in the Metropolis better served by its Council and Staff than the Royal Geographical Society. No President, whatever might be his qualifications, would be able to conduct the business of the Society satisfactorily, or at least so admirably as it had been conducted, without the cordial co-operation of the Staff.

The retiring PRESIDENT, in acknowledging the vote, said, that in what he had observed, Sir Henry Rawlinson must have drawn more upon his ancient friendship than upon anything which he (Sir Bartle) had been able to effect for the Society. Had he been remaining an inhabitant of London, he should have been very glad to have done anything he could further to serve the Society; but the work of the Society had grown to such dimensions, and required such constant attention, that without continual residence in London it was quite impossible to do justice to it. His work had been most materially lightened by the cordial co-operation of the Staff, who had rendered it in every sense a work of as much pleasure as it was of responsibility. With such a successor as Sir Henry Rawlinson, he felt certain that there would be no diminution in the prosperity of the Society; and as long as he belonged to it, no exertion should be wanting on his part to second the efforts of one who would so worthily follow in the steps of the great founder of the Society (as he might call him), who laid down the principal lines upon which he himself had endeavoured to walk in all he had done in the management of the Society; and he looked forward to Sir Henry's tenure of office as likely to be the most prosperous period of the Society's existence.

Before the conclusion of the proceedings, the President announced that the Council had that day unanimously decided that medals should be given to the servants of Dr. Livingstone who had come to England, and that a special silver medal should be struck, to be given, as a mark of approbation of their fidelity and courage, to all who accompanied the Doctor in his last great expedition.

The Rev. HORACE WALLER then led up to the President Chumah and Susi, two of Dr. Livingstone's followers, to each of whom the President gave a bronze medal.

Speaking on behalf of the two recipients, the Rev. Mr. Waller thanked the Society for the gift. These faithful companions of Livingstone were able, he said, to give an intelligible account of every river and mountain and village in the regions they had passed through; and such aid as they could give was of the first importance to Mr. Livingstone in preparing the work on which he was now engaged.

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The following letter, in acknowledgment of the Royal Medal, was received from Dr. Schweinfurth subsequently to the Anniversary Meeting. —

“ GENÈVE, ”

“ Berlin, July 18, 1874. ”

“ On the 17th instant, I received, through the medium of Count Munster and of our Ministry of Public Instruction, the great medal which you have awarded me. ”

“ On receiving this rare, high, and unique mark of distinction, I am moved by feelings of joy and gratitude which will ever accompany me to the end of my life. Allow me herewith to give expression to those feelings. ”

“ When, years ago, I set out to begin my lonely wanderings, I little expected that fortune would ever favour me with this extraordinary honour, which, emanating from the highest authority in Great Britain, is awarded by the most impartial and the most competent judges in that great kingdom; and that a corporation, to whom the opinion of the whole world assigns the supreme direction of all labour in the field of geographical discovery, would act as umpire on that occasion. ”

“ But that reward, far above my feeble deserts, which a kind Providence has cast into my lap, shall incite me to labour further at the solution of those problems which science indicates to me. There cannot be a more enduring encouragement to that end, than the one you have awarded. ”

“ All my efforts shall henceforth be directed to make me more worthy of the distinction I have been honoured with, and while I unite the warmest wishes for the welfare of the Royal Geographical Society with this determination, I preserve my medal as a token of your gratifying goodwill. ”

“ Accept, honoured gentlemen, my thankful and deeply devoted greetings. ”

*‘ To the President and Council of the Royal
Geographical Society of London. ’*

ADDRESS

TO

THE ROYAL GEOGRAPHICAL SOCIETY.

Delivered at the Anniversary Meeting on the 22nd June, 1874.

BY THE RIGHT HON. SIR H. BARTLE FRERE, K.C.B., G.C.S.I.,
D.C.L., LL.D., ETC., PRESIDENT.

GENTLEMEN,

In fulfilling my duty as your President, of laying before you a review of the Geographical events of the past year, I may begin by congratulating you on the continued prosperity and activity of the Society. By the Council Report which has just been read you have been informed that no fewer than 342 New Members, besides 9 Honorary Corresponding Associates, have been elected during the year. The total number now on our rolls is 2809 Ordinary, and 76 Honorary Corresponding Members. Accompanying this increase in numbers, and its concurrent increase of revenue, we may hope that there has been an increased activity and usefulness; and I am convinced that a Society like ours, fulfilling, as it does, a public want, may look forward to a career of prosperity proportioned to the general growth of the nation.

The improved punctuality in the publication of our 'Journal' and 'Proceedings,' so justly noticed last year by my predecessor, as reflecting so much credit on our excellent Secretaries, and especially on Mr. H. W. Bates, on whom so much of the labour falls, has been carried still further during the past season, and leaves little on this score to be desired.

OBITUARY.

DR. LIVINGSTONE. — The great geographical event of the year has been, beyond all doubt, the ascertainment of the fate of Dr.

Livingstone, and the recovery, through the fidelity of his followers, of those full records of his last expedition which his son is now preparing for publication.

In an annual summary like the present, it is impossible to do more than briefly glance at the leading events of a life devoted with unflagging energy, and without rest or intermission, to labours having for their main object the elevation of the Negro races of Africa in the social and moral scale of humanity; but one incidental result of which has been to place Dr. Livingstone in the foremost rank of discoverers and geographical explorers of this or probably of any age.

David Livingstone was born at Blantyre in Scotland, on the 19th of March, 1813, of a race distinguished in Scottish annals for that staunch fidelity to their convictions and objects in life which was so characteristic of the great traveller. The family had been reduced in fortune during the political distractions which marked the last years of the Stuart dynasty, and his parents could give to David, their second son, little more than the inheritance of sterling domestic virtues and high principles, with such an excellent practical education as the local schools of Scotland have for generations past afforded.

The epitaph which he inscribed on his parents' resting-place at Hamilton, when, after his first return from Africa, the children laid their mother beside their father's grave, records, in his own simple and touching language, his sense of how much he owed to early home-training. It runs:—"1856. To show the resting-place of Neil Livingstone and Agnes Hunter; and to express the thankfulness to God of their children, John, David, Janet, Charles, and Agnes, for poor and pious parents."

Both parents appear to have enjoyed, in their own neighbourhood, a respect due to high character and active religious principle, which secured for them a degree of consideration far beyond what could have been expected from their worldly fortune; and it was from them, apparently, that David Livingstone early imbibed those strong yet catholic religious views, and that passionate desire to extend the blessings of Christian teaching and civilization to the poorest and the meanest of mankind, which formed the main-spring of his action in after life.

From his earliest youth he had been taught the duty and the power of self-reliance; and the first use he made of such liberty as was afforded him, by having to aid in working for his own live-

lihood, was to set himself to supplement his school education by the acquisition of every kind of knowledge which came within his reach. Gradually his inclinations and studies shaped themselves to what was needed to obtain at the Glasgow University such a degree as should enable him to offer himself for the ministry, and obtain an opportunity of working with any of the great Missionary Societies which devote their labours to the extension of Christianity in distant lands; and he obtained, under circumstances which greatly enhanced the difficulty of the acquisition, a very wide and thorough elementary knowledge of surgery and medicine, and of most divisions of natural science which bear on the medical profession, besides those branches of theology which form the University curriculum of divinity students intended for the ministry of the Established Church of Scotland. The energy with which he worked may be estimated from the fact that he gained his medical diploma at Glasgow without a farthing of aid from any one; saving sufficient from his hard-won earnings in summer, to support himself whilst attending medical and Greek classes at Glasgow during the winter. Indeed, all that belonged to his early life and training is of the utmost interest to the student of human nature and the lover of human progress; but it is impossible in such an address as the present to do more than indicate very briefly the main circumstances which formed and qualified the future great explorer.

We must, therefore, pass rapidly over the history of his joining the London Missionary Society, the disappointment of his hopes of being employed in China, the acquaintance with Dr. Moffat—then already a veteran African missionary—and his final resolve to join Moffat's Mission at Kuruman or New Latakoo—at that time far beyond the utmost boundary of civilized and settled European colonization at the Cape of Good Hope. He reached Africa in 1840, and thenceforward devoted his whole being to the improvement and elevation of the races of that continent. How he learned, and laboured as a missionary, under the sagacious guidance of Dr. Moffat; how he there formed the domestic ties which lent such a human charm to the romance of his after-life; how he pondered the great questions whether Christianity or civilization should lead the way in the great work he saw before him, till he arrived at the conclusion that in these days, at all events, they cannot be separated, and they must march together; how the complex character of the great problems involved gradually unfolded itself to his meditations; how he finally realised the truth that the explorer and

traveller must precede, or at least accompany, either the missionary or trader; and how he resolved himself to be the pioneer—all this history we must leave to be unfolded by his biographer.

One of his first objects was to acquire a thorough command of the Sechuana language; one of very great power and copiousness, and spoken, with dialectic variations, over a large area of Southern Africa. In order to do this, he completely isolated himself for several months from all European society, and thus gained a clear insight into the language, habits, modes of thought, motives, and character of the African races. During this missionary period of his life he undertook seven journeys, each of not less than 600 miles; in one of which, in 1842, he was within 10 days' distance of Lake N'gami, but, probably, through being without any knowledge of the observations needful to a geographer, he gave no account of these travellings. His first attempt at publishing the result of his experiences seems to have been a paper which he sent in 1843 to Dr. Buckland, on the gradual desiccation of the countries he had traversed; but it is very uncertain whether this ever reached its destination, though the subject was well discussed at a later period.

His daring character could not remain long unknown. Kindred spirits were drawn around him, and travellers and sportsmen came from afar to consult him. Although a keen sportsman from boyhood, the heavy work of daily teaching was never neglected for self-enjoyment. At no time had he any sympathy with the mere slaughterer of game, and he seldom hunted except when it was necessary to provide for himself and those around him.

In 1843 he selected a beautiful valley called Mabotsa, between Kuruman and Kolobeng, in lat. $25^{\circ} 14'$ s., as the site of his first separate missionary station. One circumstance may here be mentioned in illustration of the powers of endurance which must be assumed when speaking of him. In 1843, whilst trying to rid the village of an old man-eating lion, he was very nearly killed by the wounded and infuriated beast. For thirty years afterwards all his labours and adventures, entailing such exertion and fatigue, were undertaken with a limb so maimed that it was painful for him to raise a fowling-piece or in fact to place the left arm in any position above the level of the shoulder. At one period especially, when so much of his time was passed in navigating the "*Pioneer*" on the Zambesi, it was frequently noticed that the false joint in the arm made him powerless to climb up the

side of a ship: that this old fracture was eventually the sole means of identifying his remains is now a matter of world-wide interest.

Kolobeng, his second station, 270 miles north of Kuruman, to which he removed in 1847, is placed almost under the tropic of Cancer, and is consequently subject to the extreme dryness caused by a nearly vertical sun. But as it is elevated from 4000 to 6000 feet above the sea, its temperature is not excessive, and it is free from marsh malaria, and thus served for a tropical sanatorium. The territories around it, with their peculiar vegetation, supported so enormous an amount of animal life, that the reports given by travellers and sportsmen of the countless herds of game would be incredible, were they not fully confirmed by Dr. Livingstone and others. In scenes and circumstances so entirely at variance with those of his early life, and amid so fine a field for his powers of observation, the young missionary at once commenced to gather that knowledge which he found of the utmost value throughout his subsequent career, either as a stationary pastor or as the enterprising traveller.

As in the outset of his career the coincidence of the China war and the visit of Dr. Moffat to this country caused Dr. Livingstone's field of enterprise to be thrown in Southern Africa, so many influential circumstances concurred to change his career from that of the quiet but active missionary, which he followed with single aim and devotion for twelve years, to that of the bold and vigorous explorer, which he continued to his last hour. Some of these remarkable coincidences it may be well to notice. Previous to the opening and development of the Overland route between India and Europe, the furlough rules of the Indian army restricted officers during their terms of leave to the Cape; many of them made for the country in which Livingstone was stationed, on account of its salubrity; the abundance of game also attracted them, and many sportsmen and travellers came to him for advice and aid, among whom were several Associates of the Royal Geographical Society. In this way friendships were begun which ended only with his death, and generous aid was afforded him which first opened his way to wider views.

Again, the political troubles arising out of the Kaffir aggressions, and the hostility of a section of the Dutch community, occurred about the same period, and leading to the entire destruction of his missionary station, induced him to change the scene of his operations to unexplored regions further north. At the same juncture, again, Arab traders made their first appearance on the Western Zambesi

from Zanzibar: had they come a year or two earlier they would have bought up and removed the ivory, &c., which Dr. Livingstone was able to utilize for crossing and recrossing Africa with his faithful Makololo. The gigantic success of these journeys at once placed him beyond the reach of adverse external circumstances as to his future progress, and thus, in the second half of his African career, he ^{was} enabled to outdo all travellers who had preceded him in any age.

Undoubtedly his own great powers, natural and acquired, were one great element in his success. The qualifications necessary to constitute a complete traveller are so many and various, that they are seldom found in any one man; but Livingstone appeared to possess them all in a most exalted degree. His personal coolness and bravery, undisturbed and undaunted in any emergency, his wonderful tenacity of purpose, his gentleness and yet firmness in dealing with the native Africans, his self-negation and power of endurance, his iron frame and its capacity of resistance to all bad climatic influences, all these greatly contributed to success; whilst the wide and extended view he had of the duties of his sacred calling, gave to his character an elevation and power far beyond what the highest mental or physical gifts could have commanded.

During the sojourn at Kolobeng he first saw slavery under that revolting aspect which roused every impulse of his generous nature into permanent antagonism.

The Dutch Boers around his mission station were perpetrating atrocities on the helpless tribes, which excited his greatest indignation: kidnapping, murder, and rapine were every-day occurrences in the neighbourhood.

His denunciation of these villanies was so determined that ultimately Livingstone found himself the centre point of an irritation and popular persecution which forboded the most serious consequences. Space will not allow us to enter very deeply into these first records of his energy; but they are by no means the least interesting episodes, and they go far to show the unchanging nature of his plans through life.

"It is difficult," we find him writing, "for a person in a civilised country to conceive that any body of men possessing the common attributes of humanity (and these Boers are by no means destitute of the better feelings of our nature) should, with one accord, set out, after loading their own wives and children with caresses, and proceed to shoot down in cold blood men and women, of a different

“colour, it is true, but possessed of domestic feelings and affections equal to their own. I saw and conversed with children in Boers’ houses who had, by their own and their master’s account, been captured; and in several instances I traced the parents of these unfortunates, though the plan approved amongst the Burghers is to take children so young that they soon forget their parents, and their native language also.”

Livingstone became intolerable in the eyes of these men, but, although tried severely, he was not found wanting. He was accused of wishing to raise the native tribes to a higher sense of self-regard, and of a desire to open up the country in which they dwelt, and as a consequence, in 1852 we find his mission station destroyed whilst he was absent, his medicines scattered, his furniture and clothing carried off and sold at auction by the Boers. “They resolved to shut up the interior, and I determined to open the country; and we shall see who have been most successful in resolution, they or I.” When we look back on his efforts, what a purpose lay wrapped in these iron-willed utterances at Kolobeng!

Livingstone’s first important journey of discovery was commenced on June 1, 1849. His object was to cross the dreaded Kalahari desert and reach the reported Lake N’gami. He had communicated his plans to several friends that he had attached to his humble home at Kolobeng, and with their generous aid he was enabled to carry them out. These were Captain (now General Sir) Thomas Steele, F.R.G.S., then aide-de-camp to the Marquis of Tweeddale, at Madras, Mr. William Cotton Oswell, and Mr. Mungo Murray. In company with the last two-named gentlemen, the lake was reached on August 1st, but the season was too far advanced for them to reach Sebituane. Captain Steele sent the account of this important journey to the Royal Geographical Society, and thus Dr. Livingstone’s name and powers were at once placed well before the world by Sir Roderick Murchison. It was at once decided by the Royal Geographical Society to take cognisance of his intrepid feat, and a chronometer-watch was awarded in 1849 to “the Rev. David Livingston, of Kolobeng, for his successful explorations in South Africa.” This was his first geographical communication, through our Society, when it was rising again into importance under the influence of his most earnest and best friend, Sir Roderick. Two years previous the Society, it may be remembered by our older Fellows, was in too languishing a condition to have afforded him much aid; but at the time that his first communication reached us,

in February, 1850, it was under the vigorous guidance of Admiral Smyth, Sir R. Murchison, and Dr. Norton Shaw: his worth was at once fully appreciated, and that lasting friendship began which was a bright feature in the lives of our late much-loved President and the great traveller. He again started for the lake in the following year; but returned without attaining his object of meeting with Sebituane. Nothing daunted, in 1851 he again started with his firm friend, Mr. Oswell, taking with him Mrs. Livingstone and his children; and they were rewarded by the discovery of the Great Zambesi River, at the end of June, 1851, in the centre of the continent, and not far from one of the wonders of the world, the unequalled Victoria Falls. At this time he seems to have formed the determination of opening a highway for commerce and Christianity by means of the great rivers to the East and West coasts; and proposed, accordingly, to Mr. Oswell to trace a route to the Eastern sea-board; but this was not carried out, and Livingstone with his family returned to Kolobeng.

At Linyante, on the River Chobe, he met Sebituane, a chief of the Makololo, a man of enlarged views, most earnestly attached to him, and who had a very marked influence on his future career. But here Livingstone was met by a severe and unlooked for misfortune. He and Mr. Oswell had hardly time to congratulate themselves on having reached Sebituane (whom he describes as "decidedly the best specimen of a native chief he ever saw"), when the chief was carried off by sudden illness.

It is somewhat singular that Dr. Livingstone should have propounded the same view of opening up Inner Africa, that was proposed in 1793 by Dr. de Lacerda, each supposing that the Great Zambesi would form nearly a continuous water-communication between the East and West coasts.

On the destruction of his house and property, and the carrying into slavery of his 200 school-children at Kolobeng, Dr. Livingstone determined on seeking an entirely new field for his missionary work. He first accompanied his wife and children on the long journey to Cape Town, crossing the entire colony with perfect safety in the midst of an inglorious but very costly Caffre war. This was his first appearance in civilized life for eleven years. He reached the Cape in April, 1852. During his sojourn here he was indebted to his firm friend (Sir) Thomas Maclear, then Astronomer Royal to the Colony, for much useful instruction in astronomical observation. Having seen his family safely embarked for England, he

started on his return journey in June, 1852, reaching Kuruman, which place he left for his next journey on November 20th, and Kolobeng on January 15th, 1853, arriving at Linyante, the capital of the Makololo, on May 23rd, and was most favourably received by the young chief Sekeletu, the successor of his late friend Sebituane.

We now mark a most significant era, not only in the life of this undaunted man, but in those busy schemes which, as they had for their sole object the welfare of the tribes around him, were liable to continual change of front as new and unlooked for circumstances arose.

In a word, to the dismay of Livingstone, the slave trade had made its way to Linyante, Sebituane's town, and was already bearing its baneful fruit amongst the Makololo people of his adoption. Some traders had reached the chief's quarters, and, in exchange for a few much-coveted guns, they carried away hundreds of captives. How was this evil to be arrested? One plan seemed to commend itself. If the natives could be shown a way to the outer world, so as to find a market for their ivory and produce, they might yet be saved.

Thus it is that we see him for thirty years eagerly looking about for a natural highway for Commerce. River after river is traced from source to sea. It is always the same hope, the continually deepening conviction; and he still trusts on that the water-ways of Eastern and Central Africa may prove sufficiently vast, continuous and deep for the cherished scheme of extended commerce and civilization "to come out all right at last."

Nothing is more striking, in his narrative of this first gigantic enterprise, than the utter disproportion of his outfit to the task he set himself. It is in such marked contrast to later experience, that it is all but incredible that he was enabled, with but a comparatively few shillings' worth of European necessities, to lead his followers to a successful termination of their work. It is true that in going to São Paulo de Loanda in search of a market for the ivory which was all but worthless to Sekeletu, he acted in some degree as the agent of that chief, and was most materially aided by his influence and commands; but he mainly depended on his gun for support for himself and his twenty-seven followers, who volunteered at Linyante for the time his journey occupied, from their departure on November 11th, 1853, until their arrival at Loanda, on May 21st, 1854, Dr. Livingstone himself being nearly worn out by fatigue and illness. Through the kindness and attention of our

Associate, Mr. Edmund Gabriel, he soon recovered, and with many presents he, accompanied by his faithful attendants, set out on his return to Sekeletu on September 20th, 1854, and reached Sesheke in the following September.

The route from the centre of Africa to the West Coast not being found so advantageous for trade as was hoped for, Dr. Livingstone at once made a resolution to try the eastern road, to the Portuguese settlements at the mouth of the Zambesi. Again furnished with ivory by Sekeletu, and accompanied by his volunteers, he left Linyante on November 3rd, and, after visiting the Victoria Falls of the Zambesi, he finally reached Quilimane, at its mouth, on May 26th, 1856, which was within a few days of four years after he left Cape Town.

He thus finished his famous journey across the continent. These travels had now excited the interest of the whole world. Such honours as it was in our power to bestow were quickly his, and the Patron's Medal was awarded him in 1855. We, as geographers, had an unbounded source of satisfaction in thus signifying our appreciation of his labours in threading the course of the River Zambesi. Already his careful observations had been forwarded to the Astronomical Department at the Cape of Good Hope, there to undergo the most searching scrutiny. How can one better describe the results than by repeating the announcement made by your then President, Lord Ellesmere, to the members of the Royal Geographical Society? In speaking of the scrutiny of Livingstone's notes, which had been undertaken by Sir Thomas Maclear and Sir J. Herschel, he exclaimed, "I believe I may say that there is more sound geography in the sheet of foolscap which contains them than in many volumes of much more pretension."

He left Quilimane on July 12th, reached the Mauritius on August 12th, and finally arrived in his native country on December 12th, for the first time, after an absence of more than sixteen years. Three days after, on December 15th, at a Special Meeting of the Society, he received such an enthusiastic welcome from his numerous friends at a most crowded assembly as is accorded to few.

The next few months were occupied with what, to him, was an arduous task—writing the account of his 'Missionary Travels.' This was done at the hospitable seat of his former friend in Africa, Mr. Webb, of Newstead Abbey.

It has been said by some who afterwards visited the Zambesi

districts, that it is almost worth a journey thither to notice the painstaking accuracy of his descriptions. Exaggeration in any shape appears throughout his life to have been so utterly foreign to his nature, that the only corrections his first observations required were usually additions to his first moderate estimate of distances travelled, of mountain heights, or breadth of rivers.

His 'Missionary Travels' met with the favour they deserved. Mr. Murray announced that 30,000 copies were sold soon after publication, besides 15,000 copies subsequently in a popular edition; and Dr. Livingstone's speeches, which will be found faithfully recorded in the 'Proceedings' of our Society, were always listened to with profound attention and the deepest interest.

We now pass to that which may be called his second series of explorations. Livingstone at this time solicited the aid of his countrymen. The Government placed at his disposal the materials which quickly formed "the Zambesi Expedition." At the grand farewell banquet given to him under the auspices of our late lamented President, Sir Roderick Murchison, on the 13th February, 1858, at which 350 guests assembled, many of the most distinguished statesmen and philosophers of the day were present, and testified by their speeches to the admiration and respect which he had earned from all classes of his countrymen.

The Expedition started for the Zambesi on the 10th March, 1858. Captain Bedingfield, R.N., Charles Livingstone (whose death we so recently deplored), Dr. Kirk, Dr. Meller, Richard Thornton, and Thomas Baines, gathered round him to share his enterprise.

Looking back upon the exploits of this adventurous little band, we find a continuous record of hard work, and each member of the Expedition pervaded by the same indomitable courage. The first act was to tramp on foot to the very heart of the continent and to revisit Sekeletu, the Chief of the Makololo, whose tribe was even then tottering to its fall.

From a geographical point of view, we note discoveries at this period of great importance. As in other places, the Portuguese were penned into their settlements by the angry disposition of the Zambesi and Shiré tribes; indeed, nothing at all was known of the sources of the rivers flowing through their territories.

Livingstone at once set about tracing the Shiré to its source, and in September, 1860, he found it flowing from the beautiful Lake Nyassa—an inland sea, which, if we mistake not, will before long be turned to great account in founding substantial relations with

the natives. Lake Shirwa was also discovered on this journey; but hardly second in importance was the newly-acquired knowledge that a high and comparatively healthy region lies stretched from the left bank of the Shiré for hundreds of miles.

If we trace an approach to enthusiasm in Livingstone's descriptions anywhere, it is when we find him detailing the industries of the Manganja and Ajawas on these hills, or describing their iron-forges, their cotton-fields and cloth-loom, their pottery, and the beauty of the fibres with which they make their nets: if we detect intense indignation, it is when he finds that the slave-traders, subsidised by the Portuguese authorities, invaded this fair region the instant his back was turned.

It was mainly owing to his representations that Bishop Mackenzie left England in 1860 to work on the lines laid down by Livingstone: the aim being to civilise and Christianise the natives. Under such a self-denying leader, with clergy, laymen, and mechanics attached to it,—with uncompromising opposition to slave trading as its *raison d'être*,—the best hopes followed the "Universities Mission."

To his great sorrow, the country Livingstone had fixed upon for the site of the mission station was hardly tenable at this time. The torrent of slavery had burst in upon the land. Both Livingstone and Mackenzie joined forces in attempting to stay the devastation occasioned by the slave wars. The liberation of large gangs of slaves and the terror of the English name in the slavers' camps were amongst the most marked features of this chapter in his life, and never did Livingstone's character shine out in truer colours than when leading his little band through the burning villages of the paralysed Manganja, to free their wives and children from the chains and yokes of the slave-drivers. The example was not lost, for we read in his last letters that, many years after, when hundreds of miles away from the Shiré highlands, a panic seized certain Arab slave-traders, who got word that he, the liberator of slaves, was in the vicinity. Nor must we omit a yet more interesting fact. On one of these occasions, a lad was freed by his kindly hand not far from Lake Shirwa: for three years the boy lived with those who survived Mackenzie; for eight long hazardous years he was the faithful servant of his liberator, and, when the spirit fled from that iron frame at last, it was Chumah, the liberated slave-boy of the Shiré highlands, that led from Lobisa to Zanzibar those men who bore their dead master's body, and to whom we are

so much indebted for the safety of the Doctor's journals and writings.

During the year 1862 Livingstone was destined to suffer the terrible loss of his wife. Mrs. Livingstone went to the Zambesi to join her husband in his work, but in three weeks she succumbed to a desperate attack of fever, which baffled all the skill of the three medical men who attended her at Shupanga.

The Zambesi Expedition lasted for five years. After Livingstone's recall in 1863, how earnestly do we find him denouncing the villany of Portuguese and Arab slave-traders! The difficulty—which was always to him a very great and real one—of facing a large audience used to vanish when pity stirred him to plead the cause of the harried tribes he had visited: how deeply the old malady of Africa had become his care let the chapters tell, which are devoted to the subject in his second book, called '*The Zambesi and its Tributaries.*'

Few will forget the enthusiastic reception accorded to Dr. Livingstone when he appeared in the Geographical Section of the British Association at Bath, in the autumn of 1864; but his short, and his second and final sojourn amongst us was mainly taken up in compiling the work which we have mentioned.

Space will not allow us to particularize the results of the Zambesi Expedition, but one fact must be noticed.

The testimony of those who witnessed the devastation of the slave trade, and who personally probed all its foul ramifications on the spot, has since borne ample fruit. Knowing as we do the extreme difficulty there has been to arouse this and other countries to the fact of the enormous development of the East African slave trade of late years, we may almost doubt if anything short of this period of trial and adventure could have opened the eyes of Europe to the true state of the case, but it was not till long afterwards that the evidence then collected moved the country to further action. It was the publication of further letters from Livingstone, written during his last journey, and detailing the still existing horrors of the slave traffic, which again directed attention to the revelations of '*The Zambesi and its Tributaries,*' and three years ago led to the appointment of a select Parliamentary Committee of Inquiry. Many of his old companions were then called on to testify to what they had seen during the Zambesi Expedition, and the national conscience was at last awakened to the truths which had been put before the public many years before. Humanly speaking, Living-

stone, and Livingstone alone, has been the means of awakening public interest in this question. His clear, explicit statements take the place of all the loose facts too often ventured on by hearsay philanthropists. He saw for himself, he attracted others to see, and he infused all his own spirit of indignation into his fellow-witnesses of these crimes.

We have now arrived at the period of his last travels. The Zambesi Expedition had not answered his expectations. The thwarting policy of the Portuguese, the ravages of the slave trade, and the unfavourable dimensions of the "*Pioneer*" for river exploration defeated his purpose; and soon after he returned home, he felt a strong desire once more to explore as he had done in earlier days.

Determined to follow up the suggestions of our late President, Sir Roderick Murchison, Livingstone left us in August, 1865, "to define the true watershed of Inner Southern Africa." He spent the winter 1865-6 in Bombay and in Zanzibar, organizing his new Expedition. How he plunged into the inner depths of the unknown regions, lying between the coast and lakes Tanganyika and Nyassa, we know from the few waifs and strays of correspondence which escaped the vigilance of slave-traders, who were too sagaciously aware of the real consequences of his presence amongst them.

Ere we next assemble in Anniversary Meeting, the geographers of every nation will have before them the full results of this last and most important of his journeys; meantime, let it suffice to say that he entered East Africa at Mikindany Bay, near the mouth of the Rovuma in April, 1866; travelled thence to the eastern shore of Lake Nyassa; afterwards doubling its southern extremity, and proceeding northerly over the Lobisa highlands to the Cazembe and to Ujiji off Lake Tanganyika, discovering, in his way, the great Lake Bangweolo, and the magnificent river, the Lualaba. For many months lost to the outer world, he was successfully searched for, found, and succoured by Mr. H. M. Stanley, who finally left him in the month of March, 1872, after which (in August) he resumed his explorations, and, near the shores of Lake Bangweolo, died on the 4th of May, 1873. His remains were preserved by his negro attendants, and carried, together with his journals and other property, during an eight months' march, to Zanzibar, whence they were brought to England, arriving on the 15th of April; on which day they were formally identified at the house of this Society by the eminent surgeon and Livingstone's former friend, Sir W. Fergusson.

Thanks to the indomitable energy of this extraordinary man, and thanks, too, to those who, by contact with him, felt their own natures raised to deeds of faithfulness and heroism, David Livingstone's journals were not only kept with scrupulous care to within a few days of his death, but brought hither by his negro followers with a devotion, which, whilst it has excited the admiration of every civilized nation, has perhaps done more than any individual act on record to raise the black races in the estimation of the world. Let us never forget what has been done for geography by the faithful band who restored to us all that it was in their power to bring of our lost friend, and who rescued his priceless writings and maps from destruction. The remains of Livingstone were accompanied to this country by one of these faithful negro attendants, Jacob Wainwright, who witnessed their interment in Westminster Abbey, on the 18th April last under circumstances which none of us who witnessed the ceremony are ever likely to forget. His grave has since been visited by two of his attendants, Chumah and Susi, who had served him yet longer and with equal fidelity, and who have been brought to England since the funeral.

Ages may elapse before the full measure of his services to Africa can be accurately measured, for we may hope that by his lifelong labours a new era will be opened to all the Negro races of that continent, and no man can foresee the ultimate consequences of their enfranchisement. We are in a better position for judging of the great value of his services to geographical science. As a mere explorer he trod some 29,000 miles of African soil, and laid open nearly one million square miles of new country, equal to one-fourth the area of Europe.

So far back as the year 1859, your President, Lord Ellesmere, pointed to the rapidly filling blanks upon the map of Africa, and, as he gave praise and honour to Livingstone, he bade his fellows look on his work that they might read the man. But these facts give a very imperfect idea of the geographical results of his labours; for not only were his own observations singularly numerous and accurate, but to his example must be attributed much of the general impulse given to African exploration by others in this generation.

As a whole, the work of his life will surely be held up in ages to come as one of singular nobleness of design, and of unflinching energy and self-sacrifice in execution. It will be long ere any one man will be able to open so large an extent of unknown land

to civilized mankind. Yet longer, perhaps, ere we find a brighter example of a life of such continued and useful self-devotion to a noble cause.

CHARLES LIVINGSTONE, the brother, and for some time the co-adjutor of Dr. Livingstone, was born at Blantyre, Scotland, February 28, 1821. He acquired the best education afforded by the schools of Blantyre and Bothwell, and like his elder brothers, often gratified his intense love of nature by long rambles with them, searching out new and interesting objects. He was afterwards employed in a lace-manufacturing warehouse in Hamilton, and on his account his parents afterwards removed to that town. He became an earnest teacher in the Sabbath-school, and there are middle-aged people who still speak affectionately of the tall slender boy, whose smiling face and kind words gave them a kindly welcome to his class. He availed himself of every opportunity for intellectual improvement, but it was not till the year 1840 that an opportunity presented itself by which he could carry out his one great desire—to secure an education that would fit him for missionary work in India or China. Hearing of an institution in one of the Western States of America, where an opportunity for manual labour placed the means of a liberal education within reach, he determined, with the advice and approval of his father and brother, to make his way to this then far distant Western land. Many difficulties obstructed his path, but we find him a few months later delighted with the success of his undertaking, and patiently devoting himself to his studies. Graduating from the collegiate, he entered the theological department of the institution, and by his earnest devotion to his work and his unassuming demeanour won the esteem of his professors and made many friends. In the autumn of 1847 he entered the Union Theological, New York City, from which he took his degree during the year 1850. In the mean time having corresponded with the London Missionary Society in reference to China, he was led to turn his attention to some other field of labour. The late venerable Rev. Dr. Storrs, of Massachusetts, took a deep interest in him, and recommended him to a pastoral charge in that state. After a short connection with this church he was selected from upwards of forty candidates to assume the pastorate of a Congregational church in a beautiful town on the Massachusetts frontier. From long-continued mental application and arduous labours his naturally delicate constitution began to give way, and

in April 1857 he obtained leave of absence for a short visit to his native land. He met his brother Dr. Livingstone in London and was with him much while he was engaged in preparing his first volume, 'Missionary Travels in South Africa.' Their long separation and warm Christian sympathy in the great work to which they had mutually devoted themselves (the amelioration of mankind) had greatly endeared them to each other. The Doctor gladly availed himself of his brother's assistance in the preparation of the book, and finding him so valuable an assistant, urged him to accompany the newly-projected "Expedition to the Zambesi." It was not without a severe struggle that Charles Livingstone decided to leave his little family and the fond attachments that he had formed in America to accept this proposal; but the idea of renewed health and strength for more successful labour in his own church led him to accept the offered position, and in March 1858 he left England for the untried scenes of a wild and uncivilised land. Through privations, difficulties, and dangers of every kind he was the Doctor's faithful assistant and companion. In 1864 he was spared to return to America, after an absence of nearly seven years from his family.

Close mental application renewed his nervous difficulties, and he was compelled to resign all thought of resuming his ministerial calling. After writing out his journal he again came to England, and in connection with the Doctor published 'The Zambesi and its Tributaries.' In October of the same year he accepted the appointment of "Her Majesty's Consul at Fernando Po"—"a fever and hunger-stricken island on which no animal, horse, cow, mule, sheep, goat, or dog can subsist," as he afterwards describes it. In 1867 an accession to his consular district was made of the "Bights of Benin and Biafra, including the mouths of the Niger," by Lord Stanley. It was in visiting these rivers in an unsuitable gunboat that he contracted the diseases (bronchitis and asthma) from which he was a great sufferer for the remainder of his life, in addition to the fever of the country, of which he had his full share. Notwithstanding all this he spared no effort to open Africa to civilising influences. His upright consistent Christian life gave him great influence with the chiefs, who often came of their own accord to seek his advice. He persuaded them to abolish many of their cruel and heathenish customs, and gave them instructions and suggestions for the better government of their people, from which they gave him the title of "The Settle Man." He was regarded by the missionaries of all

denominations as their warm and steadfast friend, and at all times took a deep interest in the progress of their work.

The Okrikas, a savage, cannibal tribe, becoming troublesome to their neighbours, he determined on a visit to them, being the first white man that had ever visited them. He sat for four hours in council with their chief and headmen, every eye fixed upon him. They took him to their juju-house, and showed him the skulls of their victims. At night they gave him an inner room ornamented with bones and skulls strung in fantastical array. His couch was composed of rude boxes, and such was their eagerness to view the white man that they could scarcely be persuaded to leave him. This visit seemed to result in great good to the Okrikas. Their chiefs were arbitrators in the late treaty with the Bonny Opobo tribes, and our allies in the Ashantee War. He was devoted to what he believed to be the highest interests of his country and humanity, and particularly sensitive to anything that tended in any way to tarnish the glory and reputation of England, a country to whose service he gave fifteen of his best years, sacrificed his health, and eventually his life. He died near Lagos, October 28, 1873, of African fever.

M. FRANCIS GARNIER.—The news of the death of this distinguished traveller and *savant*, a Lieutenant of the French Navy, slain in the performance of his duty in Tonquin on 20th December, 1873, was received by his fellow-geographers in England with feelings of profound sorrow. It will be in the recollection of many members of the Society that he attended in person at our Anniversary Meeting of 1870, to receive our Patron's Medal of the year for his exploration of the course of the Mekong River and journey through Western China. On that occasion my predecessor, Sir Roderick Murchison, summarised the deeds of the young officer, who, it will be remembered, succeeded to the command of the Cambodian Scientific Mission on the death of its commander, Captain de Lagrée, in the following words:—"In the course of this expedition, from Cratieh in Cambodia to Shanghai, 5392 miles were travelled over, and of these, 3625 miles, chiefly of country almost unknown to us, were surveyed with care, and the positions fixed by astronomical observations. In carrying out this important mission, your commander succumbed to the fatigues and privations of the harassing march between the head-waters of the Mekong and Tong-chuan, in the centre of Yunnan. Through his illness the progress of the

undertaking was for a time arrested; for one of the chief objects—a visit to Tali-fu—seemed little likely to be realised. But you nobly volunteered to undertake this hazardous journey, and, your commander having consented, you made a rapid march to the rebel stronghold, satisfactorily fixed its geographical position, and returned in safety to Yunnan, where you found your chief had died during your absence. Disinterring his remains for conveyance to your native country, you crossed to the nearest port on the Yang-tsze, and, embarking in a native boat, brought the remainder of your party in safety to the mouth of the river.” Subsequent to his visit to England he brought out, under the auspices of the French Government, his fine work, the ‘Narrative of the Cambodian Expedition,’ in two quarto volumes, with 22 sheets of maps, and 47 pictorial illustrations; a typical example of what a complete report of a great national expedition of geographical exploration ought to be.

Despatched in 1872 again to the French Possessions in Indo-China, he met with his death, it is believed by treachery, at the hands of the Chinese rebels of Tonquin. He was born at St. Etienne on the 25th of July, 1839; he died, therefore, at the age of thirty-four years.

Colonel EMIL VON SYDOW,* an Honorary Corresponding Member of our Society, was born at Freiburg, in the kingdom of Saxony, on the 15th July, 1812, and was the son of a well-known contributor to the *belles lettres* of that day. He received his education partly in the Gymnasium, afterwards in the Divisional School at Erfurt, where he at once showed the strong leaning towards the study of Geography which characterised his career through life.

With the completion of his 18th year he became an officer in the 31st Regiment of the Prussian Army, and in his 21st was attached as Master to the Divisional School, where he remained in activity ten years, latterly exclusively in charge of the Geographical Department, and where, in the year 1838, he published his first collection of wall maps. Called in 1843 to Berlin as a member of the Commission for Military Examinations, Sydow entered into close relation with Alexander von Humboldt, Carl Ritter, and other celebrities, more especially as regarded his favourite study. He also superintended the geographical studies of Prince Albrecht of Prussia, and

* By Major-General Beauchamp Walker.

in the year 1849 was appointed Lecturer on Military Geography at the new Academy, in which post he remained, with an interval of five years, to the end of his life.

During the mobilization of 1850-51, Sydow was employed as Staff Officer of the 4th Cavalry Division in Electoral Hesse. A characteristic anecdote falls into the events of this period. A suspected peasant being brought before him for examination, declared that he came from a district which we will call N. "From N.," said Sydow, "and you have red mud on your boots? You come from B." The suspected lost all confidence, and hastened to divulge all that was required of him. Not only had Sydow occupied himself with the study of Geography; he added to this branch of science that of Cartography, to which he now fully devoted himself. With this object in view he retired from active service in 1855, established himself in Gotha, where Bernhard Perthes was about to commence the publication of the '*Geographische Mittheilungen*,' for which he subsequently wrote a series of articles, entitled '*Der Kartographische Standpunkt Europas*.' In 1860 he returned to the service as Major, and was attached to the General Staff. Seven years later he became chief of a section in the subsidiary or purely scientific branch, and in 1870 was promoted to the rank of Colonel. Here he remained till the day of his death. The services which he rendered to his country in this capacity can hardly be overvalued; first in 1866, later and in a far higher degree in 1870-71, the work of his Department furnished a supply of maps to the Army which led in no small degree to the extraordinary successes of these eventful periods. In 1855 he was distinguished by the receipt of the large gold medal for Arts and Sciences, with the portrait of King William IV. He had married happily early in life, and was the father of three noble sons, the eldest of whom fell on the 28th June, 1866, at Soor-Burgendorf, as an officer of the Fusiliers of the Guard; the second was killed on the 18th August, 1870, before St. Privat, as an officer of the 3rd Foot Guards; the youngest, also an officer of that regiment, fell covered with wounds in the same battle, but, thanks to the skill of the well-known Professor Esmarck, has so far recovered as to be able to resume his duties. Last year (1872) Sydow lost his wife; the true partner of his joys and sorrows broke down under the accumulated misery of the loss of two, and the sufferings of her remaining son. I well remember the grief with which he told me of this sad bereavement. His death resulted from the after-consequences of an attack of cholera on the 13th

October, 1873, in the sixty-second year of his active and resultful life. A more amiable companion I have never known: add to this that he was a true servant of his King, a kindly superior and teacher, a good and genial comrade, and we have the picture of a man whose loss will long be felt by his country and by all who knew him. Peace to his ashes!

His principal works were the following:—

1. A School Atlas, in 42 sheets, which reached, as early as in 1867, the 20th edition.
2. Methodic Hand-Atlas for the scientific Study of Geography. 34 sheets, four editions, and on the fifth of which he was occupied at the date of his death.
3. Map of Thuringia and the Harz. 1841.
4. Atlas for the German Translation of Thiers' 'History of the Revolution, the Consulate, and the Empire.'
5. Hydrographic Atlas, in 27 sheets.
6. Orographic Atlas, in 24 sheets.

Besides these, he published a number of outline Maps, calculated for the use of schools. The elucidations of these works were also from Sydow's pen, and were for the most part published in the periodicals of the day.

For the 'Militär Wochenblatt' he published, in 1864, 'A Review of the most important Maps of Europe;' later his labour of love, 'The Register of the Geographical Statistical Department of the General Staff,' over which he presided with such marked ability. His brochure, 'North Italy, a Military Geographical Sketch,' was published in the Journal 'Unsere Zeit,' in 1860, but is incomplete, inasmuch as it wants the hydrographic portion of the work, although supplemented by an excellent Map of North Italy, compiled for the use of the Cadets' school, in whose possession it is still to be found.

PROFESSOR CHRISTOPHER HANSTEEN, of Christiania, an Honorary Corresponding Member of our Society, died on the 11th of April, 1873, in the eighty-ninth year of his age. Educated first in the Cathedral School of his native city, and afterwards in the Gymnasium of Fredericksburg, he showed at an early age a predilection for mathematical and physical studies, and in 1819 he made for himself a wide reputation in the scientific world by his work, 'Researches in Terrestrial Magnetism.' This important branch of science became his speciality, and the progress it made during a

series of years following the appearance of his first treatise, is in great measure indebted to his investigations and works. In 1828-30 he undertook a journey through Russia and Siberia, the results of which were given to the world in a narrative published in 1833.

Sir PAUL EDMUND DE STRZELECKI.—Sir Paul Edmund de Strzelecki, generally known as Count Strzelecki, a Fellow of this Society, died at his residence in Savile Row, on 6th December, 1873, in his seventy-seventh year. He was a native of the Grand Duchy of Posen, in the kingdom of Prussia, and came of a family of Counts by both parents, his father being Count Francis de Strzelecki and his mother the Countess Ann de Ruczynskish, the proprietress of Glucyna, in the parish church of which place he was baptised on 21st July, 1797. The prospects of his early life were chequered by the misfortunes of his native country, as he witnessed the French invaders in possession of the Grand Duchy, and had a painful recollection of the head-quarters of General Marmont being established in his father's chateau. After the alliance of the Four Great Powers had brought back peace to Europe, Count Strzelecki pursued a course of scientific study at the University of Heidelberg, where his taste for foreign travel evinced itself in early life, and he spent his vacations in long and careful pedestrian expeditions into Switzerland and Italy, studying the mineralogy and botany of those countries, and familiarising himself with the use of the barometer, in determining the vertical configurations of the chief mountain ranges and the fall of the rivers. Before setting out on his voyage round the globe, he visited the north of Scotland in 1830, and studied the system of sheep-farming pursued by Patrick Sellar, Esq., in the county of Sutherland, contrasting its peculiarities with the system in practice at Wartemberg, in Silesia, on the estate of Prince Biron of Courland. The knowledge thus acquired was of great importance to him subsequently in New South Wales. In 1832 he resolved to put into execution his long-cherished project of a voyage round the globe, and directed his course first of all to Canada. Here he explored the country of the Upper Lakes and discovered its rich deposits of native copper, which he thought right to bring to the notice of the Colonial Office. He passed some time also amongst the aboriginal Indian tribes, studying their character and their habits, and, striking southwards into the territory of the United States, emerged into civilised life at Washington, where he was hospitably received by

the President, Andrew Jackson. Directing his course southward, he arrived at Rio Janeiro in the autumn of 1835, where his MS. journal recounts his explorations of the virgin forests of the Sierra Estrella. Thence he proceeded to Buenos Ayres, where he was the guest of General Rosas in August, 1836. After that he ascended the River Parana into Paraguay, and was welcomed by the Dictator Francia, from whose hospitality he had some difficulty in escaping into the territory of the Indians of the Gran Chaco. Returning thence to Santa Fé, he struck across the territory of the Argentine Republic to Mendoza and crossed the Cordilleras of Chili by the pass of La Cumbre, witnessing the phenomenon of melting snow at an elevation of 15,000 feet, whilst the snow lower down, at the elevation of 10,000 feet, was found unaltered. Thence he descended by Santa Rosa to Valparaiso, where he availed himself of the hospitable invitation of the Hon. Captain George Grey, and visited with him, on board H.M.S. *Cleopatra*, the Pacific Coast of America from Chili to California, landing in Mexico and passing some time in the province of Sonora. An extract from his MS. journal depicts in bright colours the high civilisation of this province and the happy relations which existed in 1837 between the descendants of the Spanish settlers and the Yakies or native Indians. "Everywhere," he writes, "abundance is visible—everywhere are seen the signs of a generous and open hand. Avarice, penuriousness, want, and suffering, seem to be unknown. Health, peace, and content, appear to reign in undisturbed possession of this region." On his return to Valparaiso Count Strzelecki accepted the hospitality of Captain Russell Elliott, and accompanied him on board H.M.S. *Fly* to the Marquesas, the Sandwich, and the Friendly islands. He arrived at Tahiti at a very interesting moment, when what has been termed "the Pritohard difficulty" very nearly brought on war between France and Great Britain. Here he became the guest of Queen Pomare, and he may be said to have inaugurated "Trial by Jury" in her dominions, as he sat as foreman on the first mixed jury empanelled in that country, to try an Englishman accused of the murder of a native. An account of the gigantic volcano of Kirauea, in the island of Hawaii in the Sandwich group, has been introduced by him into his description of the Crystalline Rocks of New South Wales, with some valuable observations on the scientific classification of volcanic products. Count Strzelecki took leave of Captain Russell Elliott at Tahiti, in November, 1838, and proceeded in a merchant-vessel to New Zealand, and thence to New South Wales, where he arrived at

Sydney in April, 1839. His main object in visiting New South Wales was to study its mineralogy; but he soon discovered, as he himself states in his 'Physical Description of New South Wales and Van Diemen's Land,' that the scarcity of the simple minerals in the country was such as to discourage him from prosecuting any extensive mineralogical researches. His excursions, however, which he made with that object, disclosed to him a field of geological investigation of a most interesting character, and he was induced, at the urgent solicitation of Sir George Gipps, the Governor-General of New South Wales, "in the interest of science and of the colonists," to undertake a systematic survey of that portion of New South Wales which extends from 30° to 39° of south latitude, running nearly parallel with and stretching 150 miles inland from the coast. The labour of this survey was very great; it occupied him for five years. He made, to use his own words, 7000 miles on foot; he incurred an outlay of 5000*l.*, and he prepared a geological map of New South Wales and of Van Diemen's Land on the scale of one inch to the mile, which he was unable to take upon himself to publish in this country from a disappointment in the recovery of funds for that purpose, consequent on the premature death of Sir George Gipps.

"His intention," he states, "when he set out from Sydney, had been to make Wilson's Promontory, the south-eastern extremity of New South Wales, the closing point of his survey;" but he was led to pursue the enquiry into the islands of Bass' Straits, and from those islands to Cape Portland and Research Bay in Van Diemen's Land. Here he found such striking correspondence of parts to the explored tracts of New South Wales, that he could not resist the temptation to extend his explorations, until they finally brought him to South Cape, in Van Diemen's Land, and thus he was enabled to join New South Wales and Van Diemen's Land in one geological survey. To the value of Count Strzelecki's contributions to physical geography our late distinguished President, Sir Roderick Murchison, has borne ample testimony in his Presidential Address of 1844.

Of the discoveries made by Count Strzelecki after his arrival at Sydney, the most important were those made by him in New South Wales. In fact, he himself states that he made no discovery of importance in Van Diemen's Land, where, however, he received every assistance from Sir John Franklin, then Governor. But with regard to New South Wales he made the discovery, in the month of October, 1839, that extensive gold-fields existed in

Bathurst, Wellington, and other districts, which he disclosed to Sir George Gipps, and at his earnest request kept secret from the public, "lest, if he made known his discovery, the maintenance of discipline amongst the 45,000 convicts, which the Australian colonies then contained, might be almost impossible." His other important discovery was accomplished in 1840, when he penetrated through a series of rugged and sterile defiles into a most beautiful and richly-watered tract of country, which he named "Gipps Land," in honour of the Governor-General of the colony. This district had hitherto been cut off from the rest of New South Wales by the formidable chain of the Australian Alps on the north, and by a zone of almost impenetrable scrub on the south, through which he was obliged to cut his way for 26 days, advancing only at the rate of three miles a day, and having to abandon a property in pack-horses and various valuable articles, which they carried, to the amount of 700*l*.

Sir George Gipps, in inducing Count Strzelecki to undertake so laborious a survey, was well aware of the sacrifice of time and money which it would impose upon him, and he accordingly assented to the Count's proposal, "that the Colonial Treasury should be associated with the enterprise and defray half the expenses, and further assured him, in case his researches should lead to results likely to benefit the public, he would recommend her Majesty's Government to repay him all the outlay which he might be obliged to incur in his expedition."

Having completed his labours in the two colonies, Count Strzelecki resumed his original voyage, and visited Java, Borneo, and the Philippine Islands, and thence proceeded to China, and, having accomplished his projected tour, returned to England by way of Egypt in the latter part of 1843. Here he was met by the unwelcome news that Sir George Gipps had been recalled from his government and had died a fortnight after his arrival at Southampton. This event was attended with a painful disappointment to the Count, as he had relied on the intervention of Sir George Gipps with the Colonial Office to obtain for him at least the recovery of half the outlay which he had been obliged to incur in his explorations, but the Colonial Office saw no other way of indemnifying him than by offering him an appointment in New South Wales, if he should be disposed to return there. This he declined to do, as it would have defeated his plans for making known to the scientific world of Europe the results of his travels. The liberality, however,

of the Tasmanian public came to his aid in some degree, and their gratitude in subscribing a sum of 400*l.*, as a contribution towards the completion of his labours in illustrating the physical phenomena of Van Diemen's Land, determined him to venture on the publication of his 'Physical Description of New South Wales and Van Diemen's Land.' This work appeared in 1845, and at once placed the name of Count Strzelecki on the roll of distinguished geographers. Science, however, has to regret that he was soon called away from his labours as an author to undertake the relief of suffering humanity, as he accepted the self-imposed and self-remunerated mission of distributing, during a period of four years, from 1846 to 1850, amongst the famine-stricken peasantry of Ireland, the relief which the liberality of the British public had collected for them. During this period he left the question of the discovery of gold and his other claims to the course of events. Meanwhile, however, the discovery of the precious metal in New South Wales had oozed out, and later explorers not merely enriched themselves suddenly, but claimed the reward offered by the Legislative Council of Sydney to the discoverer of gold. That reward, however, was not distributed until 1853, when the Legislative Council supported the proposal of the Executive Government of the colony that the sum of 5000*l.* should be given to those who first published the discovery and taught the miners how to wash the gold, and not to him who first made the discovery and kept it secret at the express request of the Executive Government. Justice, however, was done to Count Strzelecki's scientific researches in the course of the debates of the Legislative Council in its sitting on 5th October, 1853, and his claim to the discovery of the gold-fields in 1839 was established beyond all dispute. Successive Ministers of the Crown in this country have also borne their testimony to the great services of Count Strzelecki, but, like many other public benefactors, to use the words of the Secretary of State for the Colonies in 1866, "he has had only the reward which being conscious of public service gives."

Count Strzelecki, after his return to England, obtained letters of naturalisation as a British subject in 1845. He was a Fellow of the Royal Society, and received the honorary degree of D.C.L. from the University of Oxford. He was made a Companion of the Order of the Bath in acknowledgment of his public services during the Irish famine, and, after the Order of St. George and St. Michael was extended to the Colonies, he was created, on the recommenda-

tion of Mr. Gladstone, a Knight Commander of that Order, in recognition of his great services in her Majesty's Australian colonies.

Vice-Admiral Sir ROBERT M^cCLURE, C.B.—Robert John le Mesurier M^cClure, born at Wexford 28th January, 1807, was the posthumous son of Captain M^cClure, of the 89th Regiment, an officer who served with distinction under Abercrombie in Egypt, and stood beside his General when he fell mortally wounded at the battle of Aboukir. At four years of age he was entrusted to the care of his godfather, General le Mesurier, the hereditary Governor of Alderney, with whom he resided at the Governor's house until 1819, when he was sent to Eton, and thence to Sandhurst. But the military profession being distasteful to him, at the age of sixteen he entered the Navy on board H.M.S. *Victory*. During the next twelve years he served in various parts of the world, passing his examination for Lieutenant in 1830.

In 1836 Sir Charles Adam applied to M^cClure to join an expedition fitting out for the North Pole; he at once assented, and was appointed to the *Terror*, commanded by Captain (now Admiral Sir George) Back, on a voyage to Repulse Bay. The vessel left Chatham on the 14th June of that year, and crossed Davis Strait on the 28th July. Here M^cClure gained his first experience of ice-navigation amidst the most appalling dangers: "a voyage," as Sir John Barrow observes, "of a nature extraordinary and unparalleled in the history of voyages, ancient or modern." On the return of the expedition towards the end of 1837, M^cClure received his Lieutenancy, and on the 1st February, 1838, was transferred to the *Hastings*, and afterwards to the *Niagara* on the Canadian lakes, where he distinguished himself by the capture of the leader and dispersion of a band of desperadoes, who had long set the authorities at defiance. Subsequently he was placed on the West India station from August, 1839, until 1848.

When it became necessary, after three years without tidings, to send an expedition in search of Sir John Franklin, the *Enterprise* and *Investigator* were fitted out under the command of Sir James Ross, and M^cClure was appointed First Lieutenant of the *Enterprise*. This expedition sailed in May, 1848, and after long detention in Baffin's Bay, entered Lancaster Sound, making the harbour of Port Leopold on 11th September, and here Sir James Ross was obliged to winter. In September, 1849, the ships got out of harbour and into Barrow's Strait, where they were closely beset by ice and carried out of Lan-

caster Sound into Baffin's Bay, compelling them to return to England. On his return M'Clure was promoted to the rank of Commander, and almost immediately the Admiralty resolved to despatch another searching expedition by way of Behring Strait, for which M'Clure again volunteered his services.

The new expedition consisted of the same two vessels, the *Enterprise*, commanded by Captain Collinson, and the *Investigator*, by Commander M'Clure. They sailed from England on the 20th January, 1850, but were separated in a gale of wind in the Straits of Magellan on the 20th April, and never encountered each other again. M'Clure reached the Sandwich Islands in July, and made the ice on the 2nd August. Keeping close along the American coast, he rounded Point Barrow, the extreme point to which exploration had been carried by a ship from the westward. All through August the *Investigator* encountered difficult navigation. On the 9th September they were only 60 miles from Barrow Strait: a few hours of clear sea and fair wind, and M'Clure would have connected the discoveries of Beechey on the west, with those of Parry on the east. But on the 11th they were beset; yet some further progress was made, and on the 16th the *Investigator* was only 30 miles from Barrow Strait. Here the ship wintered in the pack, and in October M'Clure started with a sledge party to the coast of Banks' Land, in the hope of solving the problem of a north-west passage in this direction. On the 26th they ascended a hill and obtained a view which settled the question affirmatively.

During the remainder of 1850, 51, and 52, M'Clure remained in these desolate regions, chiefly shut in by the ice, or proceeding slowly, retracing the latter part of his voyage, rounding the southern extremity of Banks' Land and coasting along its western shore. The dreary winters were passed in hunger and anxiety. Meanwhile unexpected aid was at hand: H.M.S. *Resolute*, commanded by Captain Kellett, arrived at Melville Island in September, 1852, and on the 6th April following, Lieut. Bedford Pim and Dr. Domville, who had been despatched from that vessel, reached the *Investigator*. "Despondency fled the ship, and Lieut. Pim received a welcome that he will assuredly remember and cherish to the end of his days."

Eventually Commander M'Clure was persuaded, though most reluctantly, to abandon his well-tried vessel, and on the 3rd June, 1853, he and his crew turned their backs on the old *Investigator* with feelings of sorrow. They reached the *Resolute* on the 17th June,

but had yet to face another winter on these inhospitable shores. The *Resolute* had to be abandoned, and after a march in the spring of 1854 to Beechey Island, took passage home in some whaling-ships. And so they made the long-sought North-west Passage. M'Clure and his gallant officers and crew are the only men who have passed from ocean to ocean to the north of the American continent. It was a glorious feat, of which the British Navy may well be proud.

The Royal Geographical Society presented M'Clure with their Gold Medal in 1854, in anticipation of his return; and a gold medal was also presented to him by the French Geographical Society. He became a Member of our body in 1855.

Captain M'Clure's commission was dated back to the day on which the existence of a continuous ocean was discovered from the hill on Banks' Land; he also received the honour of knighthood on his return to England, and a reward of 10,000*l.* was granted to the officers and crew of the *Investigator*, upon the recommendation of a Select Committee of the House of Commons, as a token of national approbation.

After his return from the Arctic regions he remained only about two years on shore. In March, 1856, he commissioned H.M.S. *Esk* at Sheerness, and proceeded in her to the China station, where he did good service during the war. In January, 1858, he was at the attack and storming of Canton, and in the latter part of his commission he was commanding officer at Singapore. He returned to England in the autumn of 1861, and received a Companionship of the Bath for his services in China. He did not serve again. He became a Rear-Admiral, and in due course a Vice-Admiral on the retired list.

The latter years of his life were spent in rest and enjoying the pleasures of a country life. He was abroad last summer for his health, when he was attacked by his last illness; he begged to be brought to England, and in his lodgings in Duke Street he calmly breathed his last on the 17th October, 1873, aged 66 years and 8 months. He was buried at Kensal Green Cemetery on Saturday, the 25th October, surrounded by brother officers in the Naval service, and men eminent in the ranks of geographical research.

Sir HENRY HOLLAND, M.D.—We have to record among our losses during the past year, that distinguished physician Sir Henry Holland. His career in life was an exceptionally prosperous and favoured one. It was remarkable for its long duration, its bril-

liancy, its scientific utility, and its beneficence; and what made it most notable was, that Sir Henry by his position was brought intimately into relationship with the most prominent persons in public life during some of the most eventful years of the world's history. Few could more appropriately quote, 'as he has done on the title-page of his Autobiography, the words of Martial—

"Hoc est

Vivere bis, vitā posse priore frui."

He was born at Knutsford, in Cheshire, on the 27th October, 1787, and died last year on his birthday, thus completing his eighty-fifth year. He was educated at a Bristol school, where he succeeded the late Lord Broughton, then John Cam Hobhouse, as head-boy. For a short time, after leaving school, he was in a merchant's counting-house in Liverpool; but before he was eighteen he took to the study of medicine in Edinburgh, where he graduated in the autumn of 1811, the subject of his Latin thesis being "The Diseases of Iceland," a country which he had himself already visited. As he was yet too young by three years for admission to the College of Physicians in London, he determined on making a tour of the Mediterranean and bordering countries, which resulted in the publication, in 1815, of a very valuable work, entitled 'Travels in the Ionian Islands, Albania, Thessaly, and Macedonia, during the years 1812 and 1813.' In 1814 he received the appointment of Domestic Medical Attendant on the Princess of Wales, afterwards Queen Caroline, on the understanding that he should accompany Her Royal Highness on her travels and during the first year of her contemplated stay on the Continent. Subsequently established in the pleasant practice of a West End physician, which, as he himself frankly admits, "abounds in cases which give little occasion for thought or solicitude, and are best relieved by a frequent half-hour of genial conversation," he yet found time for laborious scientific research, as shown by his published writings; to wit, his 'Medical Notes and Reflections,' published in 1839; his 'Chapters on Mental Physiology,' published in 1852; and his 'Essays on Scientific and other Subjects,' contributed to the *Edinburgh and Quarterly Reviews*, published in 1862. During the whole of his long life it had fallen to his lot to associate with all that was most distinguished for rank, genius, wit, learning, and refinement, not only in his own country, but in every capital of the civilised world. There was not a President or leading statesman in America that he could not call his friend. As a physician he had the heavy responsibility, as well as high honour, of

enumerating among his patients Kings and Princes, Prime Ministers, Chancellors, statesmen, and jurists, and most of those who were highly distinguished among his contemporaries for public services and for literary or scientific ability. But what is more surprising in his career, and more interesting to us as Geographers, is, that our late distinguished associate, though apparently bound by such ties of responsibility as these, contrived to indulge himself in a yearly ramble to some remote part of the world, selecting the long vacation, when most of his patients were also absent, for his holiday. In this way he managed to cross the Atlantic sixteen or seventeen times; travelled over more than 26,000 miles of the American Continent; made four expeditions to the East; three tours in Russia, two in Iceland, several in Sweden, Norway, Spain, Portugal, Italy, and Greece; innumerable voyages to the Canaries, Madeira, and West Indies, and, to use his own words, "other excursions which it would be useless to enumerate." He joined with good effect the Deputation which, on the 16th December, 1872, waited on Mr. Goschen and the late Chancellor of the Exchequer, to press the subject of an Arctic Expedition upon the notice of Government; and made some very appropriate remarks on the scientific results to be anticipated from such an undertaking.

In his various tours it was his habit to carry with him the smallest amount of "impedimenta" possible; all who chanced to meet Sir Henry abroad, whether in the Arctic zone or the Tropics, on the Prairies or the Pyrainids, found him always in the same black dress-coat in which he was so well known in London. His life was one long spell of healthy and intelligent activity. Three days before his death, on Friday, the 24th of October, he attended the Bazaine trial at Versailles, and dined at the British Embassy in Paris, "cheerful and happy, and full of conversation." On the 27th he died at his house in Brook Street, without any serious illness, but like a ripe shock of corn in its season, and regretted and honoured by all who knew him.

THE BISHOP OF WINCHESTER.—In our retrospect of the whole of the past year we meet with no event which has more painfully affected the public mind than the suddenness of the death of our illustrious associate, the Bishop of Winchester. The catastrophe was the more startling that this distinguished prelate was taken from us while in the full possession of those brilliant powers which rendered him so conspicuous an ornament, not only to this country, but to this age.

Samuel Wilberforce, the third son of the illustrious William Wilberforce, who won for himself undying fame by the share he had in the abolition of the slave-trade, was born on the 7th September, 1805, and had therefore nearly completed his 68th year at the time of his death. He received his early education at Edgbaston, near Birmingham, under the care of Archdeacon Hodson, and in due course was entered as a Commoner at Oriel College, Oxford. As an Undergraduate he commenced, at the Union Debating Society, the cultivation of that eloquence for which he subsequently became so remarkable. In 1826 he took a second class in Classics, and a first in Mathematics; his name standing in the Class-list side by side with Bishop Trower, the late Dr. Mortimer, Archdeacon Denison, Lord Henry Bentinck, and the late Lord Newark. In 1828 he received ordination from Dr. Lloyd, the then Bishop of Oxford, his "title" for orders being the curacy of Checkendon, in Oxfordshire, where he won for himself great affection by his goodness to the poor. In 1830 he was appointed to the living of Brighthelm, in the Isle of Wight, the gift of Bishop Sumner of Winchester, to whose see he afterwards succeeded in Dr. Sumner's lifetime, but whom, nevertheless, he did not outlive. In 1839 the Bishop gave him the Archdeaconry of Surrey, and a Prebendal Stall in Winchester in 1840. In 1841 he was promoted to the rectory of Alverstoke, near Gosport, a populous parish, where he had Dr. Trench, the present Archbishop of Dublin, for his curate; and, in 1843, he was appointed one of the chaplains to His Royal Highness the late Prince Consort. In 1844 he received from the then Archbishop of York the appointment of Sub-Almoner to the Queen, and early in 1845 was promoted to the Deanery of Westminster, whence, before the close of the next year, he was advanced to the Bishopric of Oxford, an appointment which carried with it the Chancellorship of the Order of the Garter. In 1847 the Bishop received the dignity of Lord High Almoner to Her Majesty. In 1869, on Bishop Sumner's resignation of the Bishopric of Winchester, Bishop Wilberforce was translated to that important see.

The melancholy circumstances of his death are fresh in the minds of us all; but it is my sad duty to recount them here, simply by way of placing them on record in this obituary notice.

On Saturday, July 19th, 1873, his Lordship, accompanied by Lord Granville, left London by the South-Western Railway with the intention of paying a short visit to the Hon. Edward Frederick

Leveson Gower, at Holmbury, near Dorking, where Mr. Gladstone had arrived to meet them. At Leatherhead they were met by a groom with horses, and the Bishop mounted one which, on account of its quietness, was a special favourite of Lord Granville's. They took Ranmoor Common in their way, and followed the bridle-road towards Leith Hill. In going down the hill towards Abinger, the road at Evershed's Rough being very full of ruts, they left it for the turf, which, though light and springy, was not good galloping ground. While the Bishop was in conversation with Lord Granville, his horse stumbled, it is thought, over a stone, and his Lordship was thrown on his head. The neck was dislocated, and death was instantaneous. Although removed so suddenly, while in the full vigour of his intellect, and with his grand energies unabated, the Bishop had well-nigh reached the term which is ordinarily assigned to human life.

Of the intellectual powers of the lamented Prelate, so well and so widely known, it seems almost superfluous for me to speak. A life of ceaseless practical activity seemed to leave little opportunity for prosecuting the literary studies for which his academical career proved that he possessed such extraordinary aptitude; but his eloquence and his command of language were such, that, whether as a preacher, a debater, or a platform-orator, he may be said to have been in his day almost unrivalled. His polished mode of thought and sparkling wit made his society a delight to his friends, and he knew how to add a piquancy, all his own, even to the witticisms of others, simply by his manner of repeating them. He took a warm interest in Geography, and had been a Fellow of our Society ever since 1846, and was twice on our Council, besides taking part for some years in our social gatherings. In an intimate acquaintance with the geography of his own country he was surpassed by very few. But perhaps the most remarkable characteristic of the late Bishop of Winchester, even more characteristic than his overflowing kindness of heart, was his inexhaustible energy. Apart from the vast correspondence entailed by his official position, he was able to find time for a great amount of volunteer work for churches and charities, and even though such toil would with many men amount to absolute drudgery, he always did his work well and with a hearty geniality. It must, moreover, be acknowledged that his efforts were invariably exerted with a view to the welfare, comfort, and assistance of those with whom his labours brought him into relationship.

LORD DE LA ZOUCHE.—The late Lord de la Zouche, known to the literary world chiefly by his former designation as the Honourable Robert Curzon, was born on the 16th March, 1810, the eldest son of the Baroness de la Zouche (baroness in her own right) and the Honourable Robert Curzon. His education was commenced at the Charterhouse, and completed at Christ Church, Oxford. It was whilst occupying the position of private secretary to Lord Stratford de Redcliffe at Constantinople that he undertook that holiday tour through portions of Turkey and Greece, visiting the various religious houses, convents, and monasteries, the results of which he gave to the world in his delightful book, ‘Visits to the Monasteries of the Levant,’ published by Murray in 1848. The description of his wanderings from convent to convent, scattered about the rocky islands, and perched on almost inaccessible promontories, and the curious literary treasures his good judgment and perseverance enabled him to bring to light, established his reputation as an Oriental traveller. He published a second book in 1854, entitled ‘Armenia: a Year at Erzeroom and on the Frontiers of Russia, Turkey, and Persia;’ but it was far from having the success of his former work, which has run through many editions, and still maintains its popularity. He was elected a Fellow of our Society in 1865. His death took place on the 2nd of August last.

KEITH EDWARD ABBOTT.—Mr. K. E. Abbott, during a lengthened period of service as Consul in various parts of Persia, distinguished himself by his contributions to our geographical knowledge of the country. His first appointment was to the Consulate of Telferan in 1841, whence he was transferred, in 1842, to Tabreez. On the death of Mahomed Shah, in the autumn of 1848, he was deputed, on the part of Her Majesty’s Legation at Teheran, to convey to the Heir-Apparent, the present Shah, Nasser-ed-din, the intelligence of that event, and to accompany His Majesty, as the official representative of the Legation, to the capital. He was appointed Consul of Tabreez in April 1854, and remained there till the rupture between England and Persia in 1856: returning to the same place, as Consul-General, on the renewal of relations with Persia, in July 1857. In July 1868 he became Consul-General of the Russian Ports in the Black Sea and Sea of Azof, residing at Odessa, and remaining there until his death on the 28th April, 1873. His first contribution to our ‘Transactions’ was a paper entitled ‘Geographical Notes, taken during a Journey in Persia in 1849–50,’ published in the

25th volume of our 'Journal.' The route followed by him during this journey led from Teheran to Savé, Kúm, Kashan, and Ispahan, and thence to Yezd, Kerman, Shiraz, and Bushire, on the Persian Gulf. Embarking at the last-mentioned place in an Arab boat, he crossed the Gulf to the mouth of the Shat ul Arab, and thence proceeded to Mohummeráh and Bagdad by the river; returning to Teheran by way of Kermanshá and Hamadán. His narrative was marked by great accuracy and conscientiousness, and his remarks on various places, rarely or never before visited by Europeans, attracted considerable attention among Oriental geographers at that time. Among his subsequent communications were his 'Notes on Ghilan' (the narrow strip of country on the south-western side of the Caspian), published in our 'Proceedings,' vol. iii., and his 'Memorandum on the Country of Azerbaijan' ('Proceedings,' vol. viii.). He had been a member of our body since 1869.

WILLIAM WHEELWRIGHT, the founder of the Pacific Steam Navigation Company, of the Central Argentine and Boca and Ensenada Railways, and of the Callao Waterworks, by whose projects and successful undertakings the Pacific Coast of South America has so materially benefited, was born at Newbury Port, Mass., U.S.A., in 1798, and died on 26th September, 1873, at his residence, Gloucester Lodge, Regent's Park. He was the eldest son of Ebenezer and Anna Wheelwright, and a descendant from an old Lincolnshire Puritan family. Educated at Andover College, Mass., he led a seafaring life from the age of 14 years, and was promoted to the command of a ship in 1823, thus acquiring a practical knowledge of most parts of the Pacific Coast. In 1829 he established himself at Valparaiso, and engaged in various enterprises for the development of that part of South America—such as the exploration of South Chili for coal, the establishment of gasworks at Copiapo, the projection of the railway from Callao to Lima, and the working of the railway from Caldera to Copiapo.

The most recent works in which Mr. Wheelwright was engaged were the Central Argentine and the Boca and Ensenada Railways. It is his peculiar merit that he undertook the first surveys for these various undertakings entirely at his own expense, and endeavoured to make them subserve the interests of various branches of science. This is shown by the paper which he communicated to our Society early in the year 1860, on "A proposed Railway Route across the Andes, from Caldera in Chili to Rosario on the Paraná,

vid Cordova," which was afterwards published in the 31st volume of our 'Journal,' accompanied by a map furnished by his surveyor; a paper which illustrates questions of engineering in the proposed scheme of carrying a railway across the Andes, and communicates much information on the climate, the mineralogical productions, and agricultural resources of the regions traversed by the surveyors. Although great difficulties surrounded his project, an important section of it was realised, and the Central Argentine Railway remains a monument of the patience, energy, and ability of its author.

In private life Mr. Wheelwright was greatly esteemed, and he leaves behind him many friends who mourn his loss. He was a frequent attendant at our evening meetings, during those intervals in his active life when he resided in London; and he occasionally took part in discussions on South American subjects.

MR. HAMILTON HUME, who was elected a Fellow in 1860, was a native of Australia, his parents having been among the earliest settlers in the colony. In his early years he was hardy and athletic, as well as intelligent and spirited; and he acquired from the natives an unusual facility for finding his way without a compass. His explorations began in 1814, when he was only 17 years of age; as he discovered, in company with a younger brother, the country now called Berrima or Bong-Bong. In 1817, having been requested by Governor Macquarie to accompany Surveyor Mehan to the "new country," they discovered Lake Bathurst, Goulburn Plains. In 1818 he joined Messrs. Mehan and Oxley in an exploring expedition to Jervis Bay; and in 1821, in company with his brother and two friends, the Yaro Plains were discovered, at which place he afterwards fixed his residence. In 1822 he was engaged on Lieutenant Johnson's survey of the east coast in search of rivers; and the late Mr. Alexander Berry and he penetrated from the upper portion of the Clyde to the present flourishing town of Braidwood. In 1824 his most difficult task was undertaken. It was to cross the country overland from Lake George—which was then the limit of our geographical knowledge—to Port Phillip Bay. Though the expedition had been suggested by the Government, but in the converse direction, it received but limited aid, and was imperfectly equipped. Mr. W. H. Howell, who is also one of our Fellows, shared in the expenditure and accompanied the expedition. Starting on the 3rd of October, 1824, they reached, on the 24th of December, the

spot where the town of Geelong now stands. Mr. Hume's account of the district arrested the attention of stock-men and flock-owners, and the settlement of John Batman in 1827 was the first step towards the founding of the flourishing sister colony of Victoria. In 1828 he was associated with Captain Sturt in his attempt to trace the Macquarie River, and they discovered the Darling, which, in an unusually hot season, was salt at the point where they struck it. Sturt says: "I have on every occasion received the most ready and valuable assistance from Mr. Hume. His intimate acquaintance with the manners and customs of the natives enabled him to enter into intercourse with them, and chiefly contributed to the peaceable manner in which we have journeyed. I cannot but say he has done an essential service to future travellers, and to the colony at large, by his conduct on all occasions since he has been with me." In 1829 he was unable to accompany Sturt on his second expedition, and he soon after settled down as a country gentleman. He died on the 19th of April, 1873, having nearly completed 76 years. A monumental pillar at Albury, on the Hume River, was erected by the colonists several years ago, and he is commemorated in several local names; and all the historians of the earlier days of the colony (including Rusden, the most recent) do full justice to the services which he rendered.

Mr. HERMAN MERIVALE, born at Dawlish, November 8, 1806, was the son of Mr. Merivale, Commissioner of Bankruptcy, by Louisa, daughter of Dr. Drury of Harrow. Sent to Harrow at ten years of age, he entered Oriel College, Oxford, at seventeen, and was subsequently elected Scholar of Trinity and Fellow of Balliol. He graduated as first class in Classics, obtaining the additional honours of first Ireland University Scholar, and first Elder Scholar. Called to the Bar about 1830, his University successes gave promise of a legal career of unusual distinction; but being elected as first occupant of Mr. Henry Drummond's Chair of Political Economy at Oxford, he devoted much time to his duties as Professor, and published his lectures on colonization, which led to his selection by Lord Grey as Under Secretary to the Colonies in 1847. Thenceforward he gave himself to official and literary labours, and in 1858 became Under Secretary to the India Office on its reorganization, in which office he continued till his death, 8th February, 1874. Besides his Lectures on Colonization and the Poor Laws, he published a volume of Historical Studies, many articles in the 'Edinburgh Review'

and other periodicals, and he completed the *Lives* of Sir Philip Francis and Sir Henry Lawrence, begun by others.

As a Fellow of this Society, he kept up a continued interest in works of geographical discovery, and in his official position at the Colonial and India Offices was ever ready to attend to matters of importance to the Society in India and the Colonies. But such an official position as his, whilst it, as in his case, absorbs talents and acquirements of the highest order, leaves little opportunity for achieving distinction by labours which oftener tend to help or correct others than to illustrate the individual labourers.

ADMIRAL FREDERICK BULLOCK, who died on February 6, 1874, in his eighty-seventh year, entered the navy in November, 1804, and served throughout the war, in the Channel, in the Mediterranean, and on the East Indian station. In 1823 he had command of the *Snap*, surveying vessel on the Newfoundland station, in which he accompanied Captain G. F. Lyon to the coast of Labrador, when that officer sailed on his voyage of Arctic discovery. He was afterwards employed on survey duties on the Home station and elsewhere.

Mr. FREDERICK AYRTON began life as an officer of the Indian Artillery; but having resigned the service, he took up his residence in Egypt, to which country he devoted himself during the remainder of his life. He will be best remembered as a profound Arabic scholar, and for his researches into Egyptian History, especially since the Arab conquest. He formed a magnificent collection of Arabic calligraphs and MSS., which he bequeathed to the nation, though unfortunately the conditions with which the bequest was accompanied prevented their acceptance by the trustees of the British Museum. He was greatly respected in Egypt, where he so long resided, and was honoured by the Khedive with the title of Bey, as an acknowledgment of his services to H.H.'s Government.

Mr. CHISHOLM ANSTEY.—Our obituary contains the names of few abler men than that of Mr. Anstey, whose great and varied learning and untiring energy promised, in the earlier parts of his career, to win him the highest position in the Senate or at the Bar. He had travelled much, and possessed a wonderful facility for the acquisition of foreign languages, and a vast amount of information on Geographical subjects. He died at Bombay, where many of the

latter years of his life had been spent in successful practice at the Bar.

In addition to the foregoing, the losses of the Society by death include:—Sir J. W. H. Anson, Bart. (who perished in the fearful railway accident at Wigan in August last), William Bleykin, H. L. Bartlett, Charles John Bayley, F. Corrance, Thomas Combe, Donald Dalrymple, Dr. R. Dobie, General W. J. D'Urban, William Gladstone, Thomas Greene, James Holmes, Sir Ralph Howard, Bart., J. B. Key, Lionel A. Levert, Thomas Letts, Lord Lyveden, W. Hanks Levy, W. Blake Lambert, Captain R. M. Murchison, Rev. John Mills, James Garth Marshall, Captain Alexander Mitchell, The Baron H. de Maltzan, General G. T. C. Napier, James Dyce Nicol, M.P., W. T. Paliologus, E. B. Philipps, F. Pearson, R. D. Parker, A. A. Paton, Sir George Rose, Sir David Salomons, Bart., Ernest A. C. Schalch, Colonel D. W. Tupper, M. E. de Verneuil, Colonel W. Wood, Edward Wates, and Commr. A. Wing.

ADMIRALTY SURVEYS.*

The hydrographical surveys undertaken by the Admiralty during the past year have embraced districts in the following countries:—England (south and east coast), Ireland (east coast); Mediterranean; Red Sea; East Coast of Africa (north and south of Zanzibar). In Australia, the provinces of West Australia, South Australia, Victoria, and Queensland. In West Indies, Jamaica and Barbadoes. In North America, Newfoundland. Western Pacific Ocean. These surveys have employed three of H.M. steam-ships—viz., the *Shearwater* of 670 tons, the *Nassau* of 695 tons, the *Porcupine* of 380 tons, one Colonial steam-vessel, two small hired steam-vessels, three hired sailing-vessels, and a steam-launch; and have been conducted by twelve naval officers in charge, with forty-seven naval officers as trained assistants, and have given employment to about 350 men.

To these surveys must be added the deep-sea exploratory voyage of H.M.S. *Challenger* (1460 tons, 400 horse-power), commanded by Captain George S. Nares, with a complement of 23 officers and 213 men, aided by a civilian scientific staff of five gentlemen, with Professor Wyville Thomson, F.R.S., as their chief.

East and South Coasts of England.—Staff-Commander Parsons and his staff, in the *Porcupine*, have performed good service in closely

* By Captain Frederick J. Evans, C.B., F.R.S., Hydrographer.

sounding the approaches to Harwich; the work extended from Orfordness to the Naze, and included seaward as far as the Shipwash and Gunfleet sands. A similar close examination of the shores from the South Foreland to Dungeness followed; the soundings extending from the coast from three to five miles. Dover bay was also surveyed in close detail, in anticipation of proposed harbour works, in continuation of the Admiralty pier.

Staff-Commander D. Hall has made during the past season, in addition to local surveys of the Medina river and Cowes roads, a minute examination of the bar at Portsmouth harbour. This survey, consequent on the dredging operations of 1871-2, shows that the proposed depth of 20 feet at low-water ordinary spring-tides, has, with the exception of a few spots of 19 feet, been realised. The completion of this valuable channel, now so near at hand, into our great naval arsenal, cannot be overrated. During the great wars, and indeed up to 1863, a line-of-battle ship was obliged to discharge her guns to proceed from Spithead to Portsmouth harbour: now any ship, drawing 25 feet, can enter at 3-hours' flood, and the heaviest draft ship at high-water.

East Coast of Ireland.—Staff-Commander Kerr and staff, in a small hired steamer, have made a patient examination of the off-lying shoal banks between the Tuskar rock and Wicklow Head. The changes that have taken place in these banks, since their survey in 1844 by the late Captain Frazer, have been of sufficient importance to navigation to demand this re-survey, and necessitate their re-buoyage, a work about to be performed by the Commissioners of Irish Lights.

An examination of the bar at Wexford, Kingston harbour, the bar of the Liffey river, and the new cutting through the bar of Lough Carlingford, formed also a portion of the season's work. Gratifying marks of improvement present themselves in the two last-named localities. The bar of the Liffey has now 15 feet at low-water springs over a breadth of two cables, and a narrow lane of 17½ feet. In 1800, the greatest depth was but 5½ feet; in 1856, 13 feet. Lough Carlingford bar, with its cutting of 400 feet wide, and a depth of 18 feet, opens up a fine harbour. A line of steam-vessels now run to the new harbour works and railway at Greenore on the west side of the lough.

Mediterranean.—Commander Wharton, in the *Shearwater*, commenced the season's operations on the east coast of Sicily, the survey of which was completed, including a plan of Taormina. An

examination of the north coast between Castel-le-Mare and Milazzo followed, including partially-executed surveys of Palermo bay and Ustica. Port Said and its approaches were also re-sounded in May, 1873. Deposit was found to have taken place around and outside the breakwaters, in certain places considerably, while in others the depth had slightly increased.

The necessity for improved surveys of the dangerous coast in the neighbourhood of Zanzibar—consequent on the increase in number of our ships-of-war engaged in the suppression of the slave-traffic—led to the *Shearwater* being transferred from the Mediterranean to meet these pressing hydrographic requirements.

Red Sea.—An important addition during the past year has been made by an exhaustive survey, on the scale of 4 inches to the mile, of the Island of Perim and its off-lying shoals, together with the small strait and the coast near Cape Bab-el-mandeb. The necessity for minute surveys in channels principally navigated by steam-vessels is apparent in this case. A valuable steam-ship was wrecked off the south-east end of Perim in 1872; by general report it was assumed that the unknown danger on which the vessel stranded was several cables' length from the land, and thus a formidable obstacle to secure navigation in a strait only $1\frac{1}{2}$ mile wide. The survey by Lieutenant Gray and the officers of H.M.S. *Nassau*, while on a passage to Zanzibar, places this danger, still marked by the wreck, just 387 yards from the south-east point of Perim. This tendency to "cut off corners" in steam-navigation is fraught with danger. The most carefully conducted hydrographic survey, in localities newly opened up to commerce, can scarcely be accountable for a lurking pinnacle rock or boulder stone so near jutting points of land.

East Coast of Africa.—Reference has been made to the pressing necessity for more accurate surveys of the dangerous line of coast on which the slave-traffic exists, and of the removal from the Mediterranean of H.M.S. *Shearwater* to perform this duty. Commander Wharton has completed the coast of Zanzibar Island and the mainland opposite, from Pungany bay southwards to Pouna point, as also the channels north and south of Zanzibar Island, with their numerous dangers. These surveys are now on their way to England; the *Shearwater* having in the mean time, owing to the sickness of her ship's company, and damages sustained to the ship in examining the intricate dangers of the district, proceeded to the Cape of Good Hope to refit and recruit.

Lieutenant Gray, with a staff of well-trained officers, has proceeded in H.M.S. *Nassau* (commissioned at Malta at the close of last year), to survey the coast southward of Zanzibar, extending from Quiloa to Port Mozambique. Operations have just been commenced, after having carried a line of deep soundings from Cape Guardafui to Zanzibar.

West Indies.—Staff-Commander George Stanley and staff, in a hired schooner, have been engaged on the south coast of Jamaica. The chief operations of the survey were the charting and sounding off to the 100-fathom line the coast between Port Royal and Morant point—a work of difficulty, owing to the fierce trade-winds which usually blow in this district. In the latter part of 1873 yellow fever, of a malignant type, broke out at Kingston and Port Royal. Many deaths ensued, and among the victims was a promising young officer, Navigating-Lieutenant Thompson, attached to the survey.

Newfoundland.—Navigating-Lieutenant William Maxwell and party, in the hired steam-vessel *Gulnare*, have been actively engaged in various localities. On the south coast the survey progressed 20 miles to the eastward. A re-survey of Port Hood in Cape Breton Island, owing to great changes in the depth of water in certain parts, was made at the request of the Government of the Dominion of Canada. The coast of Labrador from Cape St. Lewis to the latitude of 54° N. was also examined, the prominent head-lands fixed, and outlying islands surveyed. The short time during which this survey can be profitably prosecuted makes it an arduous service. The difficulties of the season's work at the beginning were further enhanced by the immense number of icebergs aground along the shore.

Japan.—The survey of the coasts of Kiusiu and Nipon is about to be resumed by Captain St. John in H.M.S. *Sylvia*. This ship was commissioned for the service in February of the present year, and has, therefore, not yet reached the ground for surveying operations.

Australia.—The marine surveys of the shores of the several colonies are steadily progressing, supported, as heretofore, by Colonial and Imperial funds.

In Western Australia, Navigating-Lieutenant Archdeacon and his assistant have surveyed, in laborious detail, the entrances and approaches to Cockburn sound, Owen's anchorage, and Gage roads, with the view to certain harbour-works in the interests of the colony. The service on this exposed coast in whale-boats, by which

slender means the duty was accomplished, is worthy of record. The party have now completed the northern and western approaches to Swan river, and are about to proceed to the small, but rising, port of Champion bay.

In South Australia Staff-Commander Howard and staff have completed the soundings off the southern shores of Kangaroo Island. In Spencer's gulf several islands and dangers seaward of Port Lincoln were examined and soundings in detail taken. The coast-line from Cape Catastrophe to Point Avoid, the inner waters of Coffin's bay, and the sea-coast thence to Point Drummond, have also been surveyed. Soundings off the wild line of coast westward of Cape Catastrophe are now in progress.

Victoria.—The surveying party under Staff-Commander H. J. Stanley have been chiefly employed in completing the coast-line of King Island at the western entrance of Bass strait, and in sounding around. The bank of soundings, extending seaward from King island in the direction of Portland bay, was found to extend 30 and 40 miles from the coast, and then to drop suddenly to depths greater than 150 fathoms. This bank of soundings should afford material aid to the navigator making the land in thick weather.

Queensland.—Staff-Commander Bedwell, in the hired schooner *Pearl*, aided by a steam launch, is steadily working northward. Port Bowen, Island head, Strong-tide passages, Shoal-water bay, Broad sound, and several islands of the Northumberland group, have been included in the year's survey. Navigating-Lieutenant Connor, detached from the *Pearl*, has been employed surveying portions of the Brisbane river; also the entrance of Endeavour river in lat. $15\frac{1}{2}^{\circ}$ s.* (here Cook refitted the *Endeavour* in 1770, after nearly losing the ship on a reef in the neighbourhood). Mr. Connor, aided by a boat and crew provided by Captain Moresby, of H.M.S. *Basilisk*, has surveyed the inner edge of the Warrior reef in Torres Strait, and the adjacent coast-line of New Guinea as far as the Talbot islands.

Contributions to Hydrography.—Much varied and useful information, including partial surveys, has been received during the past year from officers both of the Royal and Mercantile Marine.

An useful sketch survey of Amsterdam Island, in the South Indian Ocean, with nautical remarks; as also important corrections to the reef and coast features of Kandavu Island in the Fiji group, Pacific

* This survey shows a considerable reduction in the depth of water at the river's mouth, and especially in the small anchorage where Cook careened and refitted his ship.

Ocean, have been received from Commodore Goodenough and his Navigating-Lieutenant (Hosken) in H.M.S. *Pearl*.

Captain Moresby, in H.M.S. *Basilisk*, and his Navigating-Lieutenant, T. L. Mourilyan, have largely added to our knowledge of the South-Eastern coast of New Guinea; of which some further details are given in a subsequent portion of this Address, under 'New Guinea.' Between Redscar bay and Point Hood several coast localities were examined, and a detailed survey executed of a capacious harbour, which was named Port Moresby. Proceeding eastward to the comparatively unknown region between New Guinea and the Louisiade Archipelago, these persevering officers succeeded in tracing a clear passage (named China strait) close past the east end of New Guinea, and leading apparently to a clear open channel on the north, named in compliment to the First Lord of the Admiralty, Goschen strait. Captain Moresby, in his homeward route during the present year from the Australian station, where he has performed so much good Hydrographic service, will follow up the exploration of Goschen strait and the northern shores of New Guinea.

In the Eastern Pacific, Lieutenant S. T. Lecky, R.N.R., commanding the Pacific mail steam-ship *Auracania*, has materially added to the secure navigation of the western part of Magellan strait:—by patient observation of the several transit bearings of the various headlands between Cape Cross Tides and Cape Pillar (a distance of nearly 100 miles), made in his several voyages through the Strait; and these again, combined with groups of sextant angles to prominent coast and mountain features at stated distances in the ship's track, have afforded data for connecting the detached labours of P. P. King, FitzRoy, Stokes, and Mayne (1825–1869) in this now rising commercial highway. Mr. Lecky has also furnished valuable notes on parts of the coast of South America between Cape Pillar and Callao, including a clear and neat survey of Tongoy bay, a rising port near Coquimbo.

On the West Coast of Africa, Mr. R. C. Downer, while in command of the *Emily* of Glasgow, on a trading voyage to the oil-rivers in the bight of Biafra, made painstaking surveys of the mouths of the Opobo and Quaëbo rivers, heretofore uncharted. With a laudable spirit he presented his labours to the Admiralty, and they are now published.

'*Challenger*' *Deep-Sea Exploring Expedition*.—In the Address of my predecessor, last year, the general scope and arrangements of this

expedition were briefly set forth. It mentioned that no expense had been spared to render the *Challenger* perfect in equipment; that an abundant supply of instruments and apparatus necessary to carry out the physical investigation of the deep sea had been furnished, as also all the appliances which modern science could suggest in order to sound, dredge, and obtain the temperature, and other observations at the greatest depths of the ocean.

The *Challenger* had then reached Bermuda, after having visited Lisbon, Gibraltar, Madeira, Teneriffe, and St. Thomas in the West Indies, making continuous lines of deep soundings and temperature observations throughout the several tracks. The subsequent movements comprise a voyage from Bermuda to Halifax by way of the banks off Sandy Hook on the coast of the United States, and the return to Bermuda; thus crossing the Gulf Stream in two widely-spread tracks; thence to the Azores, Madeira, Canary Islands, and St. Vincent, in the Cape de Verde group. From St. Vincent a détour towards the African coast was made, and thence to St. Paul Rocks near the Equator, calling at Fernando Noronha and Bahia; thence to the Cape of Good Hope, touching by the way at the Tristan d’Acunha group.

This completed, or nearly so (depending on the tracks to be made in the homeward route in 1875-6), the Atlantic exploration. To record in the limited space at command all that has been effected in the first part of this excellent work is difficult; a few statistical details will, perhaps, show most readily the great amount of well-directed labour that has been expended in carrying out the leading objects of the expedition.

From the time of leaving England to arrival at the Cape of Good Hope, 18,610 miles of ocean have been traversed. In the deep-sea soundings, 174 casts obtained, and the nature of the bottom ascertained in each case. These casts varied from 500 fathoms to 3875 fathoms, the latter being the greatest depth observed; and, what is remarkable, only 85 miles from the land—that of St. Thomas Island in the West Indies. Of the proportion in number and depths of these deep-sea soundings we have—

In from 3150 to 3000 fathoms, 3 soundings obtained.

3000 „	2500 „	36
2500 „	2000 „	42
2000 „	1500 „	30
1500 „	1000 „	37
1000 „	500 „	25

At sixty stations, serial temperatures of the ocean were observed, generally at every 100 fathoms' depth to 1500 fathoms below the surface, the *bottom* temperature being obtained at the same time.*

At six stations, in depths varying from 8150 to 1000 fathoms, and at twenty stations below the latter depth, the dredge or the trawl was sent to the bottom, and, in most cases, fruitful-work for the naturalist was obtained.

Geographical and physical science have rarely received contributions of wider significance and importance than those derived from the *Challenger* Expedition. The reports of Captain Nares on this Atlantic Ocean exploration have been printed by the Admiralty and circulated among learned bodies and individuals as well as among those interested commercially in deep-sea telegraphy. The salient matters touched on in these reports may not prove uninteresting in this Address.

With reference to depth, the greatest found—

In the North Atlantic Ocean was	..	..	3875 fathoms
„ South Atlantic Ocean	..	..	2650 „

With reference to temperature, the lowest observed at sea bottom was—

In North Atlantic [3025 fathoms]	..	34°·4 Fahrenheit
„ Equatorial Region [2475 fathoms]		32°·4 „
„ South Atlantic [2325 fathoms]	..	32°·9 „

In the North Atlantic Ocean the most striking temperature results are, (1.) that below the upper 60 or 80 fathoms, all the water, as far north as the 40th parallel of latitude, is *warmer* than that at the same depth at the Equator. [A slight exception to this general law was found at Bermuda.]

(2.) The mean temperature of the upper 1500 fathoms is $4\frac{1}{2}^{\circ}$ warmer than that at the Equator.

(3.) The temperature of the bottom water is about 35° (ranging from $35^{\circ}\cdot6$ on the African to $34^{\circ}\cdot9$ on the American side of the Atlantic), while at the Equator it is $2^{\circ}\cdot6$ colder.

(4.) At the Equator the temperature decreases rapidly with the depth. At 60 fathoms below the surface the temperature is the same as at Madeira, with the same depth, namely, $61^{\circ}\cdot5$.

* The whole of the soundings given above, and also the serial temperatures, were successfully made with specially prepared hempen sounding-line. This line is one inch in circumference, has a breaking strain of about 15 cwt., and weighs 18½ lbs. the 100 fathoms. The bottom temperatures were obtained during the sounding operation. The serial temperatures were obtained with the same description of line, but by a separate observation.

From a position 260 miles north of St. Thomas, and thence to the Gulf Stream, a distance of 1000 miles, a warm stratum of water (of temperature 62° to 66° Fahr.) underlies that affected by solar heat and other causes. With a maximum thickness of 380 fathoms—or 330 fathoms thicker than the corresponding stratum southward—the same warm stratum was found to extend within 280 miles of the Azores, when it is suddenly lost. The origin or movement of this immense body of water is obscure; but Captain Nares considers that as its thickest part joins the warmer water of the Gulf Stream, it is evidently connected with it, and probably is an offshoot; also that as the southern and eastern boundaries of this enormous store of heat, extending as it does 2250 miles from the Gulf Stream, and remaining so steadily at the same temperature; it may be safely predicted as being produced by that stream, and to stretch across the Atlantic to the European shores north of the Azores.

With respect to the Gulf Stream, the serial temperature observations show that it is extremely superficial, extending only 100 fathoms below the surface.

Among the notable results of the surface-current observations are the following:—When the Equatorial current was running to the westward on the surface 0.75 knot an hour, at a depth of 50 fathoms the rate had decreased to 0.4; and at 75 fathoms there was still water.

Considerable difficulty—as had been anticipated—was experienced in making sounding and current observations in the Gulf Stream. Captain Nares' Report is of special interest in these practical details. On one occasion, while sounding in this ocean river, the ship had to be steamed at the rate of three knots an hour to keep up to the sounding line.

After refit at the Cape of Good Hope, the *Challenger* sailed in the middle of December (1873) in further prosecution of the voyage of research. The route selected was by way of Prince Edward, Crozet, Kerguelen, and Heard islands; thence southward to the Antarctic Circle; returning northward to Melbourne, Australia—the time occupied being exactly three months, and the distance traversed 7640 miles.

In addition to the several deep-sea soundings made in the solitary seas here traversed, much additional geographical detail was collected of the several groups of islands, more especially at Kerguelen and Heard islands. The *Challenger's* visit to these remote and desolate

spots was of special value in relation to the Transit of Venus Expedition, chosen as they were by British astronomers as the most important stations for their purpose in the South Indian Ocean. The difficulty presented itself as to the security of anchorage for the ships conveying the parties, and for communication between the ships and the latter when engaged in their astronomical duties. Our knowledge of Kerguelen Island, heretofore, was chiefly drawn from the limited survey made by Cook in his third voyage of discovery, in 1776, and from the visit made by Sir J. C. Ross, in 1840, when on his voyage of magnetical research in the Antarctic seas.

Christmas harbour, in the extreme north of the island, which was the chief haven for these two noted expeditions, had thus become classic ground, and was originally selected as the primary station—a second or auxiliary station being destined for Heard Island. Doubts, however, had arisen as to the suitability of the latter wild, outlying mountainous cluster, both with reference to the security of anchorage near its shores and the prevailing climate. To the *Challenger* was allotted the solution of these important questions, and well has it been effected. The entire absence of shelter for the ship, the difficulties that would be experienced in communicating with the observing party, and the slender chance of fine weather, are clearly set forth in Captain Nares' Report of his proceedings. Heard Island has, therefore, been rejected on these grounds as unsuitable. Fortunately the *Challenger's* experienced surveying staff were enabled, during a few days of occasional fine weather in the eighteen days to which their visit was extended, to chart a large portion of the east and south shores of Kerguelen Island. Several good anchorages, at remote distances from Christmas harbour, were examined; and thus a choice of observing stations, with various aspects and various conditions of climate under prevailing winds, are open to the Astronomical Expedition just about to leave our shores. The weather experienced at Kerguelen Island compares with that of England in winter; but, in the favoured parts, the sky is more frequently clear than it is at home in that season.

The full report by Captain Nares on this head will be greatly valued by all interested in this national enterprise.

The secure anchorages taken up by the *Challenger*, after leaving Christmas harbour, were Fuller and Hopeful harbours and Betsey cove in Accessible bay, on the east coast; Greenland bay and Island harbour in Royal sound, on the south coast of the island. A lofty range of mountains runs through the whole extent of the island in

a north-west and south-east direction, with numerous spurs spreading out on each side. The highest peak, which is near the south coast, attains a height of 6100 feet, and was named after the illustrious navigator Ross. Another lofty range, of 3200 feet, near Accessible bay, was named after Crozier, the able colleague of Ross. A central mass whose summit was 4000 feet high, and with a glacier descending to the sea on either side of the island, was appropriately named after one to whom the *Challenger* Expedition is mainly indebted—Admiral Richards.

Quitting Heard Island on the 7th February, the *Challenger's* course was shaped to the S.S.E. : on the 11th the first iceberg was met in $60^{\circ} 30' \text{ S.}$; and on the night of the 13th, during a fog and light breeze, the ship ran into the edge of the open pack-ice, in $65^{\circ} 30' \text{ S.}$ On the following day the bottom was dredged in 1675 fathoms— $1\frac{1}{2}$ mile from the edge of the pack; in this position numerous icebergs were visible, both in the pack and around, nearly all table-topped. On the 16th the Antarctic Circle, in $78^{\circ} 20' \text{ E.}$, was crossed, the western edge of the pack-ice having been followed since the night of the 13th. At this extreme southern position the weather was "wonderfully clear," no pack-ice in sight except to the northward, and had there been land of any altitude within 50 miles of the ship in an easterly or southerly direction, it must have been seen.

Working away to the eastward, occasionally in sight of the pack and strong stream ice and many icebergs, a position in lat. $64^{\circ} 18' \text{ S.}$ and $94^{\circ} 47' \text{ E.}$, or 20 miles west of Wilkes' Termination-land, was reached, when soundings were obtained in 1300 fathoms—brown ooze—the weather very fine and clear, with no appearance of land in any direction. After experiencing a heavy gale on the following day from the south-east, accompanied with its usual thick weather and heavy snow-squalls—requiring consummate seamanship for the management of the ship, surrounded as she was by icebergs—the *Challenger*, on the 25th, again stood in for the pack, and penetrated a mile within its edge, wishing to get as near Termination-land as possible; while in the pack, and at noon, with a very clear sky to the southward and eastward, and within 15 miles to the westward of the assumed position, there was no appearance of land of any kind.

On the 26th February, when in lat. $62^{\circ} 26' \text{ S.}$, and $95^{\circ} 44' \text{ E.}$, soundings were obtained in 1975 fathoms, yellowish mud; this was the deepest water found since leaving the Cape of Good Hope.

The trawl at this depth brought up numerous specimens of animal life. At the surface the sea temperature was 33° ; at 100 fathoms, $31^{\circ} 9'$; at 150, 34° ; and at 200 fathoms, 34° . Another strong gale with blinding snow was here experienced. Fortunately, just before dusk a large iceberg was seen, the ship was hove-to with a close-reefed spanker and steam up under its lee, and remained in comparative security under this friendly breakwater. A course to the north-east was now shaped, away from this inhospitable region; and, after passing the last iceberg on 4th March, in $53^{\circ} 17' \text{ s.}$ and $109^{\circ} 23' \text{ E.}$, the *Challenger* arrived in Melbourne on 17th March.

Notwithstanding the severity of the climate, both in regard to the strength of the wind and the great cold so frequently experienced, 15 ocean soundings were obtained in depths varying from 1260 to 2600 fathoms. Serial temperatures at 13 stations, dredging at 12, and trawling at 6, further followed, the results to the Naturalists of the Expedition having the highest interest.

In the field of terrestrial magnetism, much labour has been bestowed from the time of the *Challenger* leaving England. The elements of declination, inclination, and intensity are daily observed at sea, as well as at the several ports visited. The Magnetic staff includes Commander Maclean, Lieutenant Bromley, and Navigating-Lieutenant Tizard, all well-trained and competent observers.

Captain Nares' observations on the ice and climate of the Antarctic Sea passed through in his ship are of interest. He says:

"The icebergs met with by us were usually from a quarter to half a mile in diameter, and about 200 feet high. The highest measured was 248 feet, but it was evidently an old berg floating on a large base. The largest was seen furthest south in lat. $66^{\circ} 40'$; it was certainly three miles in length, and was accompanied by several others nearly as large. They were all remarkably clear of rocks or stones, although, each time we have dredged, sufficient evidence was brought up to show that the bottom of the sea is fairly paved with the debris brought by them from Antarctic lands. In shape they were nearly always tabular, the original top surface of the glacier remaining uppermost, or inclined at a slight angle to the horizon. It is remarkable how few were fallen in with to the westward of the 80th meridian of east longitude, or to the northward of the pack-ice we met there, which I believe to have been a detached patch, similar to that sailed through by Ross in 1841.

"To the eastward of $92^{\circ} \text{ E. long.}$ icebergs were very numerous, and continued so as we ran to the eastward, even when we were

at a distance from the pack. Their absence further to the westward, between 70° and 80° E. long., except when close to the pack-edge, was so marked, that, coupled with their absence on the same meridians in lower latitudes, as shown by the ice-chart, I am led to believe that there can be no land for a considerable distance south in that neighbourhood; and that a very high latitude could be gained there if desired.

“*Temperature*.—When at the pack-edge the temperature of the water was always between 28° and 29° , just sufficiently warm to melt salt-water ice very slowly, but to have no effect on the fresh-water berg-pieces. At a short distance from the pack the surface-water rose to 32° , but at a depth of 40 fathoms we always found the temperature to be 29° ; this continued to 300 fathoms, the depth in which most of the icebergs float, after which there is a stratum of slightly warmer water of 33° or 34° . Whilst in the neighbourhood of the ice, between the 13th and 25th February, the temperature of the air ranged between 34.8° and 21.5° Fahr., the mean being 31.5° ; a slightly colder climate in an average latitude of 64° S. than is found in the month of August in the Arctic Seas in latitude 74° N.

“*Barometer*.—The barometer ranged between 29.22 and 28.52 inches; when steady at 28.80 or 28.90 inches, fine weather was experienced. It rose quickly to about 29.10 inches the day before the occurrence of each gale, and commenced to fall previous to the wind increasing.

“The gales were also foretold by the unusual clearness of the atmosphere: the first blew from the eastward, shifting to the southward; the second from the northward, shifting to west.

“The prevailing winds were from the eastward. The sky was overcast for seven days out of fourteen; but we obtained sights on all but three days.

“*Whales, &c.*—A great number of fin-backed whales and penguins were sighted whilst we were near the edge of the pack; the former appeared to congregate most on the sheltered bights of the pack. Very few sperm-whales were seen, and no seals or sea-*elephants*.”

“*Summary*.—The usual Tide Tables, Light Lists, and Hydrographical Notices, have been published during the year. Among the larger works are: ‘Red Sea Pilot’ (new edition), from Suez and Akabah to the Straits of Bab-el-mandeb, and thence to Aden. Vol. i. ‘Mediterranean Pilot,’ which contains Gibraltar Strait, Coast of

Spain, African Coast to Gulf of Kabs, together with the Balearic, Sardinian, Sicilian, and Maltese islands. 'South America Pilot,' Part I. (new edition), extending from French Guiana to Cape Virgins, with the Falkland and South Shetland islands. A revised edition of the principal ports on the East Coast of the United States of America; new editions of the 'Channel Pilot,' Part I., and 'North Sea,' Part III.; useful Geographical information, relating to several islands in the Pacific Ocean and to the South-east part of New Guinea, will be found among the Hydrographic Notices.

Among the 77 new Charts published since the last Report, the Ico chart for the Southern Hemisphere deserves notice. This chart, originally compiled in 1866, has since received important additions as to the positions of drifting icebergs, and is now engraved on copper. The movements of the enormous masses of ice thrust out and rent from the Antarctic coasts, as shown on this chart, are worthy the attention of Physical Geographers.

1620 Sheets have received corrections and additions during the past year, and the number of Charts printed for the Royal Navy and the general public has been 187,248.

During the past year the Hydrographical Department, and indeed the Admiralty Surveying Service at large, has, through death and retirement, lost two of its most distinguished members, the Superintendent of charts, Captain Hoskyn, and its esteemed chief, Admiral Richards.

Captain Hoskyn had served long in the regular line of the Naval service as well as on Foreign and Home surveys. With a richly-stored mind, a well-regulated temperament, and unwearied powers of application, he was, fortunately for Hydrography, in 1865, selected to fill the responsible office of Superintendent of charts. By the remarkably efficient and genial manner in which he performed his duties, the esteem and friendship of all those who were associated or came in contact with him in official life, were secured, and few men have died more regretted than Richard Hoskyn.

The loss, through retirement, of Admiral Richards—who in his position of Hydrographer (extending over a period of ten years, and those years of very stirring times) had secured the respect, the confidence, and the grateful feelings of every member of the Surveying Service—cannot be over-estimated. That ready appreciation of fellow-workers, devotion to duty, and earnestness for the advancement of Hydrographic science, all characteristics of the man, ren-

lered Admiral Richards a worthy follower of preceding occupants of the office and a bright example to our rising school of Naval officers. The Admiral, in retiring from the post of Hydrographer of the Admiralty, carries with him wishes that he may enjoy many years of fully-restored health, and the assurance that the remembrance of his efficient services to Hydrography and kindly manner to all ranks will not be readily forgotten by his old Staff, ashore and afloat.

INDIAN MARINE SURVEYS.—A most interesting fact, connected with the progress of hydrographical research during the year, is the resumption by the Government of India of Marine Surveys, which have been almost entirely in abeyance since the abolition of the Indian navy, soon after the Government of India was transferred from the East India Company to the crown.

Captain Taylor, of the late Indian navy, has been employed since last year under the Government of India, and has submitted an elaborate review of all existing charts and materials for charts of the coast from Pakchan estuary at the southern extremity of Tenasserim to Sonmiani Bay, west of Kurachee, including all the islands of the Bay of Bengal, the Laccadives, Maldives, &c. He has also matured and submitted to the Government of India a scheme to supplement and perfect existing charts, by working up materials not yet utilized, and by fresh surveys, and has proposed an agency for carrying out his plan, which is now before the Secretary of State.

There can be no doubt that such a plan as Captain Taylor's would not only fill up many a void in our knowledge of these coasts, but would perfect and bring up to date the admirable work which has given to many officers of the late Indian navy an historical name in the annals of hydrographical science. It would carry that work to depths inaccessible to the less perfect mechanical appliances which were available to earlier surveyors, and would help to settle many vexed questions regarding average sea-levels, elevation and depression of coasts, changes of harbour waters, and tidal phenomena of great scientific as well as commercial importance.

It may be hoped that Captain Taylor's plan will be approved of by the Secretary of State, in time to enable him to commence operations early in the next season.

NEW PUBLICATIONS.—*The Indian Directory*.—Connected with the subject I have just mentioned is the *East India Directory*,

compiled by Captain Taylor, of which the first volume has been published this year. This important compilation, founded on the well-known Directory of the late Captain Horsburgh, has, however, been almost entirely rewritten, and copious and valuable additional information given. The latest information regarding the coasts and general hydrography of the Indian Ocean has been patiently and diligently collected and embodied in the work, numerous maps illustrative of the chapters on passages, winds and currents, and the tidal and glacial phenomena, have been introduced, and an entirely new section has been devoted to the Suez Canal route, now daily increasing in importance. The subject of steamers' passages has received due attention, and that of the winds, cyclones, and general meteorology, brought up to the standard of our present knowledge. The book, while containing so much additional matter, has been much reduced in bulk—in itself a great boon to the navigator; a clear type being adopted, with the admirable system of putting the leading words in conspicuous type, long since adopted by the Admiralty. I trust that the author's new duties will not delay the appearance of the concluding volume.

Petermann's 'Geographische Mittheilungen.'—This valuable journal still maintains its high position among the serial publications devoted to geographical science. Since the last Presidential Address, many important papers have been produced, recording the progress of exploration and investigation, accompanied by well-executed maps, delineating the country visited by travellers and the results of their observations, or illustrating the physical conformation of the earth's surface, or its divisions for administrative purposes.

The very able articles, referred to by my predecessor last year, upon Arctic geography and exploration, by the editor, have been continued, recording the progress of the various expeditions undertaken by the different European nations and the United States, with the additions to our knowledge of those regions resulting therefrom. These include a description of the various kinds of drift-wood collected on the shores of Nova Zembla, with a view of ascertaining the direction and extent of the currents, the temperatures and physical phenomena observed on board the *Albert*, at Spitzbergen, in 1872; a very complete account of the expedition into Smith's Sound, under the late Captain C. F. Hall; numerous letters from the fifth Swedish expedition, at Spitzbergen, under the

command of Professor Nordenskiöld; and, lastly, a *resumé* of the Arctic campaign in 1873.

Professor Mohn has followed up his previous paper on the temperature of the seas between Greenland and Europe by a valuable essay on the Climatology and Meteorology of the waters surrounding Nova Zembla.

With regard to Asia, several interesting letters from the officers and others of the Russian expedition to Khiva have appeared in the 'Mittheilungen;' Baron Richthofen also records his journey through China, and Dr. Hirth describes the province of Quang-tung; some letters are also published from Captain Prjevalsky, on the Ethnology and Physical Characteristics of Mongolia and Tibet, with a valuable itinerary of the road from Urga to Lassa.

A supplement is devoted to an exposition of the important contribution to our knowledge of the interior of Africa between Natal and the Zambesi, performed by Carl Mauch between 1865 and 1872; and another contains four exhaustive reports on the Physical Configuration, Vegetation, Geological Productions, and the People of the Caucasus, by Dr. Radde, director of the Imperial Museum at Tiflis.

Among other papers on Africa may be noticed a report of a new exploration of the Libyan Desert by Gerhard Rohlfs, Ernest Marno's researches on the Upper Nile, and Dr. Nachtigal's routes on the Bahr-el-Ghazal.

The discoveries of Giles, and Gosse and Warburton in Central Australia, to the west from the line of electric telegraph, are each recorded as far as information has been received. Dr. Bernouilli contributes an interesting paper on a journey in Guatemala in 1870.

The results of the *Challenger* expedition, principally relating to the temperature of the North Atlantic Ocean at various depths, as far as they have been made known, are condensed and illustrated by a map.

Italy.—I am indebted to our much-esteemed honorary corresponding member, the Chevalier Cristoforo Negri, for the following details of geographical progress in Italy:

The Military Topographical Institute (the branch resident at Florence of the General Staff, which is stationed at Rome) has continued its geodetic labours with zeal and ability, and now little remains to complete the great fundamental map of the whole of

Italy and Sicily. The map of Sardinia, compiled from the researches and at the private expense of the late General Alberto La Marmora, has not yet been revised. The publication of maps has also continued, great use being made of the method of engraving by photography, introduced by General Avet.

The Royal Marine has confined its labours almost exclusively to the Adriatic (in connection with the Imperial Austro-Hungarian Marine), and the chart of the Gran Cabotaggio, which dates back more than half a century, will be greatly improved. It will then be necessary to think about a maritime chart of Sicily and the West of Italy; the English and French maps leaving much to be desired, as is frequently found to be the case. The geological map is also progressing, though slowly, owing to the want of a staff of paid subalterns. Some provinces (as, for instance, Forlì) have published voluminous scientific monographs on their territory. The numerous works and projects for railways and canals have made us better acquainted with the hypsometry of Italy.

The Alpine Club has now its branches in nearly all parts of Italy, and the travels of many of its members furnish valuable, though unconnected and fragmentary, materials for the science of geology.

The botanist Dr. Odoardo Beccari, subsidised by the town of Genoa and the Italian Geographical Society, continues his excursions in the south-east of Malaysia, and in some parts of New Guinea, and sends rich collections to Italy—both to Genoa and to Rome. Concerning the explorations of this indefatigable savant, in New Guinea and the neighbouring islands, I shall give a further account in a subsequent section of this Address.

The Italian Geographical Society is concentrating its resources, and preparing to send a scientific expedition to Shoa, where it will receive the support of the Prince of that country, who has sent an envoy to Rome. The expedition would proceed in a westerly or south-westerly direction from Caffa, or Kaffa, into an unknown region. The expedition will be commanded by the naturalist Antinori, who has already visited the south-western affluents of the White Nile and the country of Bogos, and Lieutenant Parent, who accompanied Nordenskiöld to Spitzbergen two years ago.

The Society is continually increasing in numbers, and we may hope that any re-organisation which may be in contemplation will maintain and extend its sphere of usefulness. The actual effective president is Signor Correnti, Councillor of State; and Signor Negri enjoys the title of Perpetual President and Founder;

but every lover of geography will regret that, owing to his absence from Rome, and other causes, he now takes no part in the direction.

ARCTIC EXPLORATION.—The hope expressed by my predecessor that the year 1874 would see the despatch of an exploring expedition to Smith Sound, has, I regret to say, but little chance of being realised. The joint Arctic Committee, appointed by the Royal Society and our own Society, for the purpose of preparing a statement of the valuable results to science that might be expected from such an expedition, held various meetings during the summer of 1873; and on the 6th of November the Council of the Royal Society nominated several of their body to co-operate with us in representing to the Government the desirability, in the interests of science, of such an Expedition. A joint deputation from the two Societies * to the Government was soon after resolved upon, to which representatives of the British Association and the Dundee Chamber of Commerce were to be added, but in reply to my application to the late Prime Minister for permission to wait upon him, I received the following letter :—

“ 10, DOWNING STREET,

“ 29th November, 1873.

“ MY DEAR SIR B. FRERE,

“ I have now been able to consult my colleagues with reference to the request which you have conveyed to me on the subject of the proposed Deputations from the Royal Society, the Royal Geographical Society, the British Association for the Advancement of Science, and the Dundee Chamber of Commerce, to present Memorials praying the Government to undertake an Arctic Expedition.

“ I must recall to your attention that the Government decided, during the present year, that no further voyage of discovery should be undertaken, until the voyage of the *Challenger* should be completed. It was on this broader ground that they decided, and not on the narrower ground only, of the actual state of the particular question of Arctic Exploration.

“ I would remind you that the operations of the survey are at present very incomplete. By survey I mean generally the examination of coasts more or less available for trade and general intercourse. These operations, generally, the Government hold to have a stronger claim than those of discovery : they are prosecuted with as much activity as general considerations of expense will permit ; but were Her Majesty's Ministers disposed to augment the charges for Naval Services not strictly professional, they would incline to do so for survey rather than by a new voyage of discovery at the present moment.

“ If it be thought that there are reasons which should induce the Government to alter the decision recently and deliberately adopted, I am obliged to

* Consisting, on the part of the Royal Society, of Professor Allman, Professor Busk, Dr. J. D. Hooker, Professor Huxley, Mr. Frestwich, Mr. P. L. Sclater, and General R. Strachey ; and on the part of the Royal Geographical Society, of Sir Bartle Frere (President), Sir Rutherford Alcock, Admiral Sir George Back, the Earl of Derby, A. G. Findlay, C. R. Markham, Admiral Sherard Osborn and Sir H. C. Rawlinson.

ask the favour that the reasons be presented to us in a written form, when I should have the best and full opportunity of considering them in common with my colleagues.

"I remain,

"Very faithfully yours,

(Signed) "W. E. GLADSTONE."

In compliance with the concluding request in this letter, I addressed the Prime Minister as follows:—

"22, PRINCES GARDENS,

"6th December, 1873.

"MY DEAR MR. GLADSTONE,

"I have to thank you for your letter of the 29th November, and for your kindness in stating so fully the grounds on which it was formerly decided to undertake no Arctic Exploration until the voyage of the *Challenger* should be completed.

"You will, I am sure, pardon me when I say that I do not think the connection between the voyage of the *Challenger* and the proposed Arctic Exploration is very obvious.

"I do not in the least undervalue the probable results of the *Challenger's* voyage. Even so far as they have gone, those results have shown their importance to the ocean navigator, to our submarine telegraphs, and to many branches of science of direct commercial value, apart from the great purely scientific questions which are illustrated every week she is at sea.

"But, except in these latter points of pure science, I know of nothing that the *Challenger* is doing which has much connection with the problems to be solved by the proposed Arctic Expedition.

"As regards immediate commercial results, every shipowner and seaman might find matter of interest in both Expeditions; but while the *Challenger's* results affect mainly the Atlantic and Pacific, and their commerce, the Arctic Expedition, commercially, most interests the great fishery ports, and those engaged in manufactures of Indian fibre, which cannot exist without animal oils.

"We all, commercial men as well as geographers, recognize and lament the very incomplete and inadequate condition of our naval surveying operations. There has been a very slight improvement of late years; but, upon the whole, the means at the disposal of the present able and zealous officer who advises the Admiralty on these subjects are, I believe, less in proportion to the whole naval expenditure than they were many years ago in Admiral Beaufort's time—certainly they are far less than the requirements of our greatly extended commerce demand.

"I gratefully acknowledge what has been done, partly as a result of the late mission to East Africa, in sending surveying ships to the east coast of that continent; but I think you will find there is very little survey work going on anywhere else. I know that in the Indian seas the lamentable deficiency of marine surveying of late years, as compared with some of the magnificent surveys executed more than 40 years ago by the East India Company, are subjects of daily remark by all commercial and nautical men. And on the great highways between Australia, England, India, and China, are large regions, which, for want of surveys, are given up to pirates and man-stealers: whereas, if they were surveyed as New Zealand was surveyed, within a very few years after our flag was first seen in those waters, those regions might be of the greatest commercial value to the whole world.

"You will, I am sure, pardon me for taking exception to the expression in your letter which indicates an opinion that voyages for survey, or discovery,

are not strictly 'professional naval services.' I believe that in these days, when it is so difficult to find a seaman's training for our young officers and men, when so much of the work is done by machinery, there are few better naval schools than a surveying ship; and that, if such ships were multiplied, not only would commerce benefit, but your men-of-war would be better supplied with practical seamen, both among men and officers, than is possible at present.

"This is still more the case with regard to any Arctic voyage of discovery. Service in the Arctic Seas, under any conditions, is one of the best possible schools for seamen, and is one of the few schools which now remain by which a thorough seaman can be formed, quite equal to the best men of former days.

"Moreover, as a matter of fact, some of our very best practical officers are men who distinguished themselves in Arctic exploration; and I doubt whether there is a single hour of any Arctic voyage of discovery which, in a strictly professional point of view, may not be considered well spent as training for any naval service.

"In reply to the kind invitation with which your letter concludes, that I should submit to you in written form the reasons which seem to us sufficient to induce the Government to alter its decision to postpone all Arctic discovery until the voyage of the *Challenger* is completed, I venture to forward some papers which I had intended to place in your hands as explaining, in more detail, the grounds of our application:—

"1. The first is a description of the several deputations who wish for the honour of an interview.

"2. The second is a Report of the Arctic Committee of the Royal Geographical Society.

"3. The third is a memorandum drawn up by that Committee for the Arctic Committee of the Royal Society; and

"4. The fourth is a brief sketch of the general grounds of the application of the Royal Geographical Society.

"The following are, shortly, the reasons why we urgently request that you will do us the favour to fix an early day for the reception of the deputation:—

"First, because any preparation for an expedition to sail in 1874 ought to be commenced at once.

"Secondly, because the several scientific and mercantile bodies represented by the deputations naturally expect that their reasons for a naval Arctic Expedition may be considered before a decision is finally formed; and though the papers enclosed state most of the arguments of the Royal Geographical Society, I cannot undertake to state all the reasons which might be urged by those members of the Council who are practically acquainted with Arctic discovery. Nor can I anticipate the special grounds which might be urged by the Royal Society, the British Association, and the Dundee Chamber of Commerce.

"Thirdly, that, even if her Majesty's Government should finally decide that the expense cannot be included in the Estimates now under preparation, the questions we would beg you to consider by no means end there. I have reason to know that at least in two quarters there is a very strong disposition to undertake as a private enterprise what I cannot but consider ought to be a national work; that very considerable sums will be risked in the attempt, partly on commercial grounds, partly as an expression of what I believe is a very wide-spread feeling on the part of the public who interest themselves in such questions.

"I may add that I am personally opposed to entrusting any such work to private hands: not on account of the expense, which I calculate could never, even if everything were done on the most liberal scale, exceed 25,000*l.* per annum;

but because I consider the object of such national importance that the we ought to be undertaken by the nation; and because the risks, which I believe are very small to a well-appointed and well disciplined Government expedition, are much increased if entrusted, as in the case of the *Polaris*, and of many other less successful expeditions, to men who are not under naval discipline or control. And, lastly, because the risk and difficulty in the first instance will be enhanced by a private expedition, without any certainty of saving any ultimate cost to Government. I look upon failure as far more likely to result from the private expedition than from one undertaken by the Admiralty, and I do not see, in the event of any disaster overtaking a private vessel, how it will be possible for the Government to avoid the expense of subsequent expeditions to look for her and her crew, after the experience we had in Franklin's case, showing that if the survivors of the expedition had been promptly looked for, many—probably most—of them might have been saved.

"I have little doubt that, should we not succeed in altering the views of Government as expressed earlier in the year, the Government will be applied to to aid an expedition under private auspices, and more or less at private expense. This would place the question in a position which, to my mind, would be less satisfactory than if Government undertook the whole expense.

"It is true that, if the funds were supplied by private individuals, Government might concede the commissioning the ships, so as to place the expedition under naval discipline; but to my mind it is not desirable to allow any authoritative interference by private parties, which it would be difficult to prevent unless the whole is under the unquestioned control of the Admiralty.

"May I submit that much time and trouble might be saved to her Majesty's Government, if you would consent at an early date to hear the arguments of the several deputations. Any delay till after Her Majesty's Ministers separate for Christmas may be productive of serious inconvenience and loss, especially should any private expedition be attempted too late in the season to go out fully equipped.

"Believe me, dear Mr. Gladstone,

"Ever yours faithfully and sincerely,

"H. B. E. FRERE.

"The Right Hon. W. E. Gladstone, M.P."

The change of Ministry, which occurred not long after this letter was written, has delayed any further steps being taken in reference to this important subject. But the Council propose to bring it again before the present Ministers, and hope to obtain a favourable hearing. I should do injustice to Mr. Gladstone were I not to mention the strong personal interest he takes in expeditions of Arctic Discovery—an interest which does not seem to have diminished since, in 1834, he took an active part in the Select Committee of the House of Commons, which expressed so high an opinion of the national importance of Arctic Exploration, and of the valuable service which Sir James Ross had rendered by its promotion. In other directions the past year has not been an active one in Arctic projects. We have not received the official account of the remarkable voyage of the *Polaris*, up Smith Spound, of which a brief sketch was given in last year's Address. But an excellent *résumé* of the geographical

information brought by the American Expedition was given by our Secretary, Mr. Clements R. Markham, on the first evening of the present Session, in a paper in which he also communicated the results of the voyage of his relative Captain Markham, R.N., in the *Arctic*. The interest in this department of geography may be said now to centre in the fate of the Austrian Arctic Expedition under Payer and Weyprecht, which sailed in June, 1872, in the direction of Behring's Straits by way of Nova Zembla, and which has not been heard of since Count Wilczek left the gallant little party on the shores of Nova Zembla in the month of August of the same year. Attempts will no doubt be made, during the present summer, to obtain tidings of this Expedition; and I may mention that this is one of the objects of the journey of our Associate, Mr. Joseph Wiggins, of Sunderland, who has sailed in the yacht *Diana* for a summer's cruise in the Spitzbergen Sea.

ASIA.—*Palestine Survey*.—Major C. W. Wilson, R.E., Director of the Topographical Department of the War Office, has furnished me with the following account of the progress of the Palestine Survey, in continuation of that given in the Address of last year.

The Survey of Palestine which is being made, on a scale of 1 inch to a mile, for the Palestine Exploration Fund, by Lieutenant Conder, R.E., Mr. Tyrwhitt Drake, and three non-commissioned officers, R.E., from the Ordnance Survey, has made considerable progress during the year that has passed; 1750 additional square miles have been completed and the finished map now extends from Nazareth to Bethlehem, and from the sea to the Jordan, covering an area of over 3000 square miles.

By the middle of June, 1873, the survey had been carried down the coast from Carmel towards Jaffa; but, in consequence of the great heat, this portion of the work could not be completed, and the party were obliged to retire to Bludan, in Anti-Lebanon, where they remained from July to October. From Bludan several excursions were made; the principal one being to Mount Hermon, where a number of observations for latitude were taken, and the true bearing of Carmel and other points in the survey determined. In October work was resumed in the south of Palestine, and by the end of November the survey had been carried down to the northern end of the Dead Sea and the mouth of the Jordan. In December a very severe outbreak of fever in the camp necessitated a removal to Jerusalem, where the party were delayed till the beginning of

March by the extraordinary severity of the weather, which prevented all work in the field; but as soon as the weather moderated they returned to the Jordan Valley, and carried the survey northwards to within two or three miles of the Sea of Galilee. This section of the work is of special interest, for it has given us, for the first time, a correct representation of the topographical features of the western side of the Jordan Valley, and an accurate survey of the windings of the Jordan; a number of salt-springs were found at different points of the valley, and attempts were made to register the variations in the level of the Dead Sea by means of a wooden gauge, but unfortunately the gauge was destroyed by the Bedawin. In April the portion of the Maritime Plain left unsurveyed in the summer of 1873 was completed, and the party then retired to Jerusalem to continue the plotting and drawing of the fair plans.

Lieutenant Conder has recently returned to England, bringing with him three sheets of the survey, which contain about 1600 square miles, in a finished state, including hill features. The survey sheets are accompanied by seventy large scale plans and special surveys of important places, such as Cæsarea, Beisan, &c.; two volumes of MS. notes, containing detailed measurements of every important ruin in the country, with a description of each, written on the spot; lists of all names, written in Arabic and English, and arranged alphabetically for each sheet; and about fifty water-colour drawings of places of Biblical interest, studies of figures, animals, &c.

A geological map of the district survey has also been prepared, and specimens collected.

Lieutenant Conder returns to Palestine in July, and hopes to complete the survey of Western Palestine from Dan to Beersheba, in the same thorough manner as the work which he has brought home during the winter season of 1875-6.

Of the American expedition, under Lieutenant Steever, U.S. Engineers, we have but slight information; after measuring a base line on the Plains of Moab, near Hesban, and completing the survey of about 500 square miles of country, the expedition returned to America, but no account of its labours has yet been published. It is believed that a second expedition is now being organised in America to continue the survey east of Jordan during the winter of 1874-5.

The completion of Mr. Murray's Map of Palestine by the publication of the southern sheet during the past year should not remain

unnoticed. Carefully compiled, and well engraved, the map is far superior to any previous Map of Palestine, and cannot fail to be of great assistance to all students of Biblical geography.

Persia.—Last year Colonel Valentine Baker and Lieutenant Gill, R.E., travelled from Tehran to Meshed, and thence northwards by Kilat to Mahmoodabad, and round by Koochan, Shirivan, Bujnurd, and Jajarm to Shahrud and Tehran. The journey was for a considerable distance over a new country, and has added much to our knowledge of the district north of Meshed and around the head waters of the Attrek and Giurgen.

A reconnaissance of the route followed, with astronomical observations at certain points, was made by Lieutenant Gill, and since his return to England the work has been laid down on a scale of 4 miles to 1 inch, and the reconnaissance embodied in a general map of the north-eastern frontier of Persia, on a scale of 20 miles to 1 inch.

Russian Empire and Mongolia.—An expedition of a remarkable and enterprising character has been accomplished, under the auspices of the Imperial Geographical Society, by Captain N. M. Prjevalsky, of the Staff Corps, who travelled for nearly three years in the most remote parts of Inner Asia. For a considerable time—viz., from the spring of 1872 to the end of the summer of 1873—M. Prjevalsky was entirely cut off from all intercourse with the civilised world. The expedition was composed of Captain Prjevalsky, Lieutenant Pyltseff, and two Cossacks. Starting from Peking, he first travelled through Chakhar Mongolia, as far as the northern bend of the Yellow River, whence, crossing the desert of Alashan to the neighbourhood of Sining,* at that time disturbed by a revolt of the Dungans, he visited Lake Koko-nor, and arrived on the northern borders of Thibet at the Upper Yang-tsze-Kiang or Mourou-ussu. Undaunted by the difficulties and dangers of the journey, M. Prjevalsky and his companion travelled 11,000 versts (7300 English miles), 5300 of which have been projected on the map,† with the aid of a route-map, based on 18 positions astronomically determined. The scientific results of this expedition are most important, including a number of hypsometrical and meteorological observations, and a valuable collection in Natural History. The labours of M. Prjevalsky serve to supplement Hue's description of the Tsaidam

* M. Prjevalsky was 60 versts (40 miles) to the east of Sining at Chobseng.

† It is to be regretted that the observations taken by M. Prjevalsky do not include the longitude as well as the latitude of the places he visited.

country and Kan-su, besides acquainting us with the fauna on the banks of the Mourouï-ussu and the tribes inhabiting Koko-nor, Alashan, Kan-su, and Amdo. On comparing these travels with the works of Chinese * authors, and with an itinerary from Urga to Lhassa, communicated by M. Shishmareff, as well as with the travels of Mr. Ney Elias through Western Mongolia, we find excellent materials for correcting our knowledge of the geography of this part of Asia, which was hitherto based on the surveys of the Jesuits in the eighteenth century. For further details regarding this important exploration, I may refer to Mr. Ney Elias's annotated account of them in No. 1 of the present volume of our 'Proceedings.'

Dr. Fritsche, the Director of the Peking Observatory, has lately travelled through Eastern Mongolia, on his way from Peking to Nerchinsk in Eastern Siberia, on a visit of inspection to the meteorological station at the latter place. Entering Mongolia by one of the northern passes leading from China, he diverged from his direct road in order to explore the south-eastern border of Mongolia. He found by hypsometrical observations that the general elevation of the country did not exceed 600 to 1550 mètres (2000 to 5000 feet), and that the height of some of the highest mountains was not more than 2000 to 3000 mètres (6500 to 10,000 feet). Dr. Fritsche's observations prove the incorrectness of the statements of the Jesuits, according to which Peh-cha is described as a mountain 15,000 feet above the sea-level. Indeed the Chinese, who were questioned by M. Fritsche as to the presence in that country—especially in Wei-chang—of a mountain which attained the level of the snow-line, invariably answered in the negative; and declared that they had never heard of the name of Peh-cha. After visiting Hailar, the trade centre of North-Eastern Mongolia and Trans-Hingan Manchuria, Dr. Fritsche entered Russian territory at Tsurukhaitu. He describes that part of Mongolia visited by him as steppe-like, thinly populated, with lakes and rivers gradually drying up. He has since arrived at St. Petersburg, from which city he sent us in March last a copy of his map of East Central Asia, in which all the geographical and hypsometrical observations made by recent Russian travellers have been utilised.

In Northern Mongolia we have to notice an expedition by M. Paderin from Urga to Uliassutai, with the special object of dis-

* Translated by Father Palladius and M. Uspensky, see the 'Proc. of the Imp. Geog. Soc.' for 1873.

covering the ruins of Karakoram, the exact position of which is unknown. The itinerary of M. Paderin contributes to the geography of the basins of the Orkhon, the Upper Selenga, and the steppe-rivers flowing north and south from the Khankai-ola Mountains.

North of Paderin's route another journey has been made by the enterprising merchant Veselkoff, who travelled from the district of Minusinsk, in Siberia, to the Chinese outpost of Dzindilik, on the Upper Tess, and afterwards through an unexplored country to Kossogol. His remarks on the country of the Upper Selenga and its Mongol inhabitants are worthy of attention. M. Veselkoff was the first European to visit the Chinese post at Agar, and the stake fence dividing the lands of the Mongols from those of the Darkhats.

The south-eastern branches of the Altai Mountains, the valley of the Black Irtysh, and the basin of Lake Uliunghur, have been explored by MM. Sosnoffsky, Miroshnichenko and Matusoffsky. M. Sosnoffsky discovered that no actual hydrographical connection exists between Lake Uliunghur and the Black Irtysh, although he believes that this lake once belonged to the oceanic basin when the river flowed out of the lake; afterwards, probably owing to some gradual change, the lake became confined in a separate continental basin. The Irtysh now flows at a distance of only two or three versts ($1\frac{1}{2}$ to 2 miles) from the lake; the whole of its eastern shore is known by the name of the heights of Tsir Guntai—the bare, gravelly plain, strewn with pebbles and shells, and covered with frequent salt marshes, bears the unmistakable appearance of having been recently submerged; and there is still a tradition among the inhabitants that the body of Uriankhai, who was drowned in the lake, was afterwards found in the Irtysh. Sosnoffsky also collected information upon the course of the Black Irtysh, and was the first to correct the wrong impression hitherto prevailing about that river, which represented it to be a wide deep stream with a rapid current. Its greatest width is at the mouth of its tributary, the Kaba, where it forms a bay 100 fathoms wide. Below the Kaba, *i.e.*, towards Zaisan, its width is from fifty to sixty fathoms. As to its depth, the river is only unfordable immediately

after the spring floods, about the ^{25th March} 6th April; at any other time there are plenty of fords, and they are particularly frequent above the mouth of the Kaba. Thus the river is only navigable as far as the Kaba, and only light craft can ascend higher. We also find,

from these researches, that the basin of the Black Irtysh slopes gradually towards the west, and is bounded on the north by the Altai Mountains, while to the south rises the Saura, a range unknown till quite recently, but in which there are peaks attaining a height of 12,000 feet above the level of the sea. Cartographers are indebted to the observations of MM. Matusoffsky and Miroshnichenko for new materials for correcting their maps of the country adjacent with the Black Irtysh and Lake Uliungur. Of especial value is the astronomical position of Bulun-Tokhoi, by means of which a projection can be made of Morozoff's caravan-route from the Upper Irtysh to Khobdo, Uliassutai and Barkul.

In another part of the Chinese Empire, bordering on Russian Manchuria, Lieut.-Col. Barabash, of the Staff Corps, has recently made an interesting journey. Ascending the Sungari, to the mouth of the Nouni, he made his way up this river to Tsitsikhar, the capital of Northern Manchuria, whence he descended both rivers to Sansing, at the mouth of the Hurka; followed the course of the latter river up to Ninguta, and then, crossing the mountains to the basin of the Suifu, terminated his long journey at Nikolsk.* His journals, which will soon be published, will contain some new facts relating to this almost unexplored country, and will therefore be of exceptional interest to geographers.

Turning from the borders of China to Asiatic Russia, we have to notice an interesting expedition, organised and equipped by the Imperial Geographical Society under the command of M. Chekanoffsky, assisted by MM. Müller, Ksenjopolsky, and Nachvalnich. Some accounts of the Lower Tungusska Expedition have been published in the 'Proceedings of the Russian Geographical Society,' to which reference should be made by all who are desirous of acquainting themselves with the details of this scientific mission. We can only notice it briefly here. Early in the spring of 1873, the members of the expedition assembled in the district of Kirensk, and, as the severity of the climate would not allow of an immediate start, they employed the time in the meanwhile in scientific excursions in the basins of the Lena and Upper Tungusska. In the end of May they embarked in a boat for their voyage down the Lower Tungusska River. Müller made astronomical and magnetic observations, Ksenjopolsky attended to the collections, the topographer Nachvalnich kept an itinerary, noting the names of the places

* Nikolsk must not be confounded with Nicholaieffsk at the mouth of the Amur.

according to the local nomenclature, with the assistance of a native guide, while the leader of the party studied the geology of the country. Some of the collections of Chekanoffsky have been received in St. Petersburg, and the other results of his labours, as well as those of his companions, are in the course of publication. Towards the end of December last year Chekanoffsky and Müller started on another expedition to Olenek: their route will lie along the Upper Tunguska, and afterwards through a country part of which is entirely unexplored.

The military expedition last year to Khiva led to some important geographical results, which are in a great measure due to the zealous co-operation of General von Kaufmann, Governor-General of Turkestan, and General Krijanoffsky, Governor-General of Orenburg. It was at the instance of the former that the Imperial Geographical Society framed a list* of instructions to guide and assist scientific explorers, who might accompany the expedition, and furnished them with the necessary instruments for taking observations. Among the most recent accessions to our knowledge of the Oasis of Khiva, and the Aralo-Caspian Plains, we will notice the reports of Kuhn and Krause, the magnetic observations of Ovodoff, and the astronomical observations of Sirovatsky, the specimens of water drawn from the Aral Sea by the commander of the flotilla, and the fossils found by Dikhoff on the banks of the Amu Daria. Of especial interest also are the researches of M. Bogdanoff, a young naturalist of great promise, who accompanied the expedition to Khiva, and brought home a collection of fish from the Amu Daria. Glukhoffsky's researches below Kunia Urgendj, along the old bed of the Oxus, complete the survey of the whole extent of the Usboi, the lower part of which, from Igdy and Ortakui to Balkhan Bay, had previously been explored by Stebnitzky. The latter officer has recently been engaged in some topographical work in the Turkoman Steppes, south of the Usboi, and has determined twenty-one positions astronomically, besides taking numerous hypsometrical observations.

In European Russia MM. Chaslaffsky and Barkoffsky, known for their researches, the former in the Moscow region, the latter in that of the Niemen, have collected statistics relating to the corn-trade in the Azoff-Don country, from which it appears that the large increase† in the export of corn from the ports of the Sea of Azoff is

* * These instructions were prepared by a committee of the Geographical Society, and were distributed among all three detachments.

† The exports from the ports of the Sea of Azoff increased from 20,000,000 in 1865 to 70,000,000 in 1871, and 90 per cent. of the exports were cereals.

caused by the vastly extended area of cultivation, owing to the development of railways, and new laws for the tenure of land in the country of the Don Cossacks. Lastly, in concluding this brief summary of Russian geography during the past year, I must allude to the labours of MM. Mainoff and Poliakoff in the government of Olonetz; the remarks of the former on the traces of the glacier period, and of the latter on the sectarian population in the district of Onega, are worthy of attention.

In the prospective arrangements for the coming season, Russian geographers are displaying great activity. An expedition has been organised by the Imperial Geographical Society to explore the delta of the Amu Daria and its different channels, to establish two meteorological stations on its right bank, and to ascend the course of the river as far as circumstances may permit, in order to ascertain how far it is navigable. Another party will execute a series of levellings in the Aralo-Caspian plains, determining with accuracy the difference in the levels of the two inland seas. An exploring party, under Captain Glukhoffskey, will make further researches in the Usboi or old bed of the Oxus, while a third party, under the auspices of the Society of Naturalists attached to the University of St. Petersburg, amongst whom are MM. Bogdanoff and Barbot de Marny, will visit the elevated plateau of the Ust-Urt. We also hear of scientific expeditions to the southern spurs of the Thian Shan Mountains in the direction of Kashgar and to the mountainous region east of Lake Issyk-kul.

Indian Land Surveys.—According to the official Report, the work of the Great Trigonometrical Survey during the year 1872-73 consisted of 92 triangles, covering an area of 11,058 square miles with the great theodolites, and of 3224 square miles, closely covered with points for the topographical surveys, with smaller theodolites; while several points have been fixed over an area of 7290 square miles of a portion of the Himalayas, inhabited by independent tribes, which will be valuable for preliminary geographical requirements. An area of 2734 square miles has been topographically surveyed in the Himalayas on a scale of 1 inch to the mile, and an area of 3878 square miles, on the 2-inch scale, in the Bombay Presidency.

Among the more salient points of the survey are the completion of the "Bider series," a longitudinal chain of triangles extending from Bombay to Vizagapatam, through one of the most unhealthy parts of India, which has been effected by a party under the com-

mand of Mr. W. C. Rossenrode; the continuation of the Assam operations, in the midst of extraordinary difficulties, by Mr. W. G. Beverley; the resumption of work at the Mangalore meridian series by Major Branfill; and the Brahmaputra survey by Captain Carter. In Kumaon and Gurhwal the survey has been under the direction of Lieutenant I. Hill, R.E., who last year carried on operations in the Mána valley, in the lake country to the east of Naini Tál, in the country round Lohur Ghat, in the portions of the Gori and Ramganga valleys near Arkot, and in the Bhabar parganahs. Much of the 2734 miles surveyed during the year by Lieut. Hill's party was between 10,000 and 25,000 feet above the sea-level.

With regard to the Topographical Survey, seven parties have been in the field during 1872-73, as in the previous year. The total amount of work done was 25,327 square miles of final topography, only 6136 of which were in British territory; the remaining 19,191 being in native states. The tracts thus explored were for the most part wild and unhealthy; and those in Bilaspur, Mandla of the Central Provinces, the Garo, Naga, and Northern Chittagong hills, were covered with forests; in parts uninhabited, and never before entered by a European. An account of the operations in the Garo district, replete with interesting and valuable information with regard not only to the topography and physical configuration of this wild region, but also its geology and natural history, has already been communicated to our Society by the officer in command, Major Godwin-Austen, and published in our 'Journal.' There were, however, four parties engaged at the same time in completing the surveys of this region, comprising the Northern Chittagong hill-tracts, the Tipperah, Lushai, and Cachar hills, the Garo and Naga hills, and the Northern Muniপুর frontier. The various portions of this wide district were allotted to Major Godwin-Austen, Captain Badgley, Mr. Cook, and Lieutenant Woodthorpe. Altogether, 11,273 square miles were surveyed by these detachments. In Rajputana, 2760 square miles were delineated topographically by Captain Strahan.

Great progress was made during the year in the drawing and compiling branch of the head-quarter office of the Survey, under the energetic superintendence of Mr. I. O. N. James, in reducing, compiling, and incorporating the latest survey results on the original sheets of the Indian Atlas. Nine new quarter-sheets have been taken up, and considerable additions have been made to eleven of the old full-sized sheets. A great number of other maps

have also been completed, or are in progress. In the photographic branch, Captain Waterhouse, who has charge of this department, reports that 1611 maps have passed through his office during the year.

The Revenue Surveys have been continued during the year; four Cadastral Surveys being now at work in the North-West Provinces. The Annual Report of the Geological Survey has been this year drawn up by Mr. H. B. Medlicott, the accomplished colleague of Dr. Oldham, the founder of the Survey, who was absent on sick-leave in Europe for the first time during his twenty-two years' service. Dr. Stoliczka, another colleague, joined the Kashgar Mission party under Mr. T. D. Forsyth; and after taking part in various explorations carried out during the stay of the Mission, died on the return journey to India. The loss of this able public servant and zealous naturalist is much to be deplored.

Central Asia.—The most important additions that we have received during the past year to our knowledge of the geography of Central Asia have been furnished by the Mission which Mr. Forsyth has conducted to the Court of the Ataligh Ghazee. An account of these has been given to the Society at so recent a period as our last evening Meeting, by Sir Henry Rawlinson, to whom I am indebted for the brief résumé I now give you. Mr. Forsyth's Mission, although primarily constituted for political purposes, was also admirably equipped in respect to the interests of science; Colonel Gordon, with his coadjutors, Captains Biddulph and Trotter, and Dr. Stoliczka, forming perhaps as efficient a party as the whole of the Indian services could furnish for the exploration and investigation of an unknown region. As far as Kashgar the labours of the Engineer-officers were mainly directed to the verification of the previous observations of Messrs. Shaw and Hayward, but beyond that point they entered on an entirely new field of operations. Colonel Gordon first led his party to the Chadir-kul Lake, about 100 miles to the north of Kashgar and within the Russian frontier, thus for the first time joining the two great systems of survey which have been so long at work in the north and south of Asia. We can well understand, indeed, the feeling of honest exultation with which Captain Trotter, who represented the Great Trigonometrical Survey of India with Mr. Forsyth's Mission, announces that "the scientific operations of Russia and England have now crossed each other in

friendly rivalry, the road from Kashgar to the crest of the Thian-shan (or Celestial Mountains) being a link in the chain across Asia, common to both countries."

Colonel Gordon found the crest of the Turgat Pass a few miles south of the lake—which crest seems to be now generally adopted as the Russian frontier—to be about 12,800 feet above the level of the sea, and he observed that, although there was no immediate drainage from the lake itself, it formed the watershed at this point between the east and west, the Aksu and the Arpa, which rise in the same basin as the lake between the two extreme ranges of the Thian-shan, flowing respectively, the one eastward into Turkistan, and the other westward, to join the Naryn or Upper Jaxartes.

On returning to Kashgar from this very interesting trip, Colonel Gordon despatched a party, under command of Captain Biddulph, to the eastward, on the road to Aksu. Captain Biddulph travelled for one stage between the Kizil and the streams of Yapchan, and supplies some important information with regard to the nomenclature of these rivers. He ascertained, indeed, that the main river above Yapchan actually bore the name of Yaman-yar, which had been hitherto supposed to be an invention of the fictitious German Baron, and also that the largest of the channels into which the Yaman-yar was divided was entitled Derbuchek, as given by the Baron in a more correct form than the Telwachook of Mr. Shaw. After passing Fyzabad, at 35 miles from Kashgar, and Kizil Arvat, at 46 miles, all habitation ceased, and the remainder of the road to Maralbashi, about 100 miles, lay through the thick jungle which lined the banks of the Kizil River. Near Maralbashi, which is placed in the published maps very much to the south of its true position, Captain Biddulph observed an isolated basaltic rock, with a treble peak, rising 2500 feet above the plain. It is a very remarkable natural object, and, as was to be expected, is invested with a holy character. The Yarkund River passes by Aksah, about 32 miles south-west of Maralbashi; but its further course to the eastward was not ascertained. Charwagh, indeed, one stage beyond Maralbashi (also called Burchuk), on the Aksu road, was the farthest point to the eastward which the party reached.

But by far the most important of the subsidiary expeditions, which have so nobly illustrated Mr. Forsyth's Mission, and which recal the old geographical triumphs of Elphinstone and Malcolm, has been Colonel Gordon's exploration of the Pamir Steppe. The party left Kashgar on March 17, and travelling by Yengi Hissar and Sir-i-kol

(Sarik Kúl), reached Kilá Penja at the confluence of the two main arms of the Oxus on the 13th of April. They had hoped to have been permitted to have continued their return journey to India *via* Cabul, either crossing the range from Badakhshan into the Chitral valley, or making the détour of the Bamian Pass; but the state of Afghanistan, where civil war has broken out and threatens to lead to serious disorder, created an insuperable difficulty, and they were accordingly, by the last accounts, preparing to recross the Pamir to Tash-kurghan, and so on to Yarkund, from whence they would follow in Mr. Forsyth's wake to Leh and Cashmire.

As the Pamir has been lately traversed by a number of native explorers, whose various routes and notes have been sifted and methodized by Colonel Yule, it cannot be expected that any new physical features of importance should have been discovered by Colonel Gordon's party; but the labours of these officers have been most valuable in verifying the native accounts in some instances, and in disproving them in others, and more especially in obtaining a correct view of the general orography and hydrography of the region. It appears that a stream does actually flow both from the west end and the east end of the lake in lesser Pamir, usually called Barket Yassín; the former stream, as was known before, joining the Sirhad or southern arm of the Penja, while the eastern stream unites with the Aktash water, and then, turning abruptly, flows north-west through the greater Pamir till it joins an affluent from the Kara-kul Lake and forms the considerable river of Murghabi, which, entering Shignan at Barpenj, passes through the entire length of that valley (identified by Colonel Yule with the "*Vallis Comedorum*"), and debouches into the Oxus at Wamir, five stages below Kilá Penja. A very valuable result of this determination of the course of the Karakul branch of the Oxus is, that it proves the Barket Yassín, in the lesser Pamir, to be the highest point in the steppe, since the stream which flows out of that lake crosses the whole extent of the greater Pamir in its onward course to Shignan. Colonel Gordon further determined that the Kizil-yurt Plain was the true watershed between the east and west; the Turkestan river system being fed by the drainage of the hills which buttress this plateau, while the numerous lakes and streams, which are found on the table-land, invariably run off westward to the Oxus. The frontier of Wakhan was also found, as stated by Abdul Majid, to extend over the great Pamir Steppe as far as the Murghabi River, where it marched with Kokand, so that, in theory at least, the territories of

our ally, the Ameer of Cabul, are conterminous in this quarter with a region dependent upon Russia.

We must await the arrival of Mr. Forsyth's detailed report before attempting to resolve other obscurities which still attach to the lower course of the Oxus in its passage through Roshan and Daxwuz, before it turns south and debouches in the plain country of Badakhshan.

SOUTH AMERICA.—The interest of South American exploration has for some time centered chiefly in the efforts made by the Peruvian Government to obtain an accurate knowledge of the courses of the many tributaries of the Amazons flowing through their territory, especially with regard to their navigability and the economic uses that can be made of them. The progress of these surveys has been briefly recorded from time to time by my predecessors, and I may now add that an excellent summary, from the pen of Lieutenant Juan Salaverry, of the Peruvian Navy, was published in the October number of 'Ocean Highways.' According to the latest accounts, Admiral Tucker, under whose direction these fluvial surveys have been made, submitted to the Peruvian Government, last December, a report of his proceedings up to that date. Two steamers had been engaged during the latter part of 1873 in surveying the main stream of the Marañon down to the Brazilian frontier, and the northern tributaries, Morona, Pastaza, Potro, and Tigre. The great southern affluent, the Huallaga, had also been submitted to a more accurate exploration than had hitherto been undertaken; all the chief points being determined astronomically, the country along the banks examined with regard to its adaptability for settlement, and the furthest point of steam-navigation ascertained. Whilst active work is thus continued in the eastern portion of the Republic, the veteran geographer, our Honorary Corresponding Member, Don Antonio Raimondy, has exchanged his labours in the field for the not less useful toil of elaborating the results of his researches in a general work on the geography and products of Peru, for the preparation of which the Government has made a liberal grant of money.

Further south, I may make a passing allusion to the journey of our Associate, Captain Musters, and Mr. Hegan, who left England last winter with the intention of proceeding from Buenos Ayres, by way of the upper waters of the Paraguay and its tributaries, to Sucre, in Bolivia. The Council provided Mr. Hegan with a set of instruments for determining positions and heights, and it is hoped that some addition to our knowledge of this part of the continent may

result from the undertaking. I have a letter from Mr. Musters, dated from Sucre in Bolivia, and the accounts he gives of his route show that we may expect from him matter of much interest regarding yet unexplored portions of Central South America.

According to the latest accounts, our Associate, Mr. Keith Johnston, who quitted the service of the Society at the end of last year to join a Scientific Commission organised by the Paraguayan Minister in London, to explore Paragnay, had found, on his arrival, the country so distracted by revolutionary movements, that the Commission was dissolved before it had an opportunity of commencing its labours. Resolved, however, not to return home without accomplishing some exploration, Mr. Johnston had offered his services to General Vedia, commander of the Argentine forces in the Gran Chaco, to undertake a survey of the little-known region between the Argentine post of Villa Occidental and Salta, and was in daily expectation of orders to proceed with the work.

AUSTRALIA.—The chief event of the year in Australian geography is the bold and hazardous journey performed by Colonel P. Egerton Warburton, and his party of fourteen men, across the unknown western interior of Australia, from a station on the line of Overland Telegraph and Nickol Bay. For the successful carrying out of this undertaking the Council of our Society unanimously decreed him one of the Royal Medals of the year; and the details of the journey, so far as they have yet reached us, show how well this reward is deserved. Colonel Warburton started with his party, having a number of camels as their beasts of burthen, from Alice Springs, near Central Mount Stuart, on the 15th April, 1873, with the object of reaching the shores of the Indian Ocean and ascertaining the nature and resources of the previously unknown intermediate country. According to the brief account given on his arrival at Adelaide by Colonel Warburton, his course at first lay along the northern face of the M'Donnell Ranges, through a country which appeared to be well watered in ordinary seasons, and offered no great difficulties. The valleys between the parallel hilly ridges were fertile; but when the expedition had got so far westward as to be outside of the limits of the range, it fell in with very bad country—arid and barren, and covered with *spinifex* or porcupine bush, that constant sign of a barren soil throughout the greater part of Australia. As the party continued their toilsome way westward the appearance of the country became worse and worse; lines of sand-ridges presented themselves without any signs of surface water. Their

sufferings from thirst were at length relieved by the discovery of water, through the sharp sight and intelligence of a native belonging to the party. It was, however, very limited in quantity, and beyond it, towards the west, the aridity of the country became worse than ever. "Not a desert," as Colonel Warburton expresses it, "because not utterly destitute of vegetation. Rain sometimes fell, as testified by the scrub, but no surface water remained." The ascent and descent of the sand-ridges overtaxed the strength of the camels, and it was found prudent to march only in the coolness of the night. After some weeks of this kind of travelling, hunger began to assail the party, and one after another of the camels had to be slaughtered to keep themselves alive. At length, whilst the leader was prostrated by illness, and craved to be left behind to die, the remainder of the party strapped him to the back of a camel and made a push for the Oakover River, a tributary of the De Grey, near which were some outlying stations of West Australian colonists. Two of the men were sent on to the nearest station for succour, and returned, after an absence of sixteen or seventeen days, with food and horses, supplied by Messrs. Grant, Harper, and Anderson, of the De Grey River station. Without this timely aid the whole party must have perished. Intelligence of their arrival quickly reached the Government at Swan River, who had for some months expected their arrival at some of the frontier settlements, and a vessel was sent to Nickol Bay to bring them to the capital, whence they departed soon after for Adelaide, reaching that place in April, twelve months after their departure from Alice Springs. Great praise has been accorded by Colonel Warburton to the authorities of Western Australia for the cordial aid and hospitality rendered to the heroic band; and at Fremantle and Perth triumphal arches were erected in their honour. The arrival of Colonel Warburton at Adelaide was also celebrated by a public banquet on a large scale. I ought not to omit to record the fact that the cost of this important enterprise was sustained by two private colonists, the Hon. T. Elder and Captain Hughes.

The contemporaneous expedition of Mr. Gosse, dispatched by the South Australian Government from a position on the Overland Telegraph line south of the starting point of Colonel Warburton, although not successful in crossing to the western settlements, reached the shores of the Great Salt Lake in the interior, which had been discovered a short time previously by Mr. Giles, and named by him Lake Amadeus. From this point Mr. Gosse was obliged to return.

Of expeditions in other parts of Australia, space only permits me to mention that of Mr. W. Hann, in Northern Queensland, who, during the months from June to November, 1863, explored the difficult country along the head-waters of the Lynd, Mitchell and Bloomfield rivers, and reached Princess Charlotte's Bay.

NEW GUINEA.—An expedition which has excited much interest among geographers and naturalists is that of M. Miklukho Maklay, a Russian *savant*, to the north-eastern coast of New Guinea. After passing a year on that island, in Astrolabe Bay, this traveller visited the Philippine Islands and Hong Kong, proceeding thence to Batavia, where he stayed for a time with the Dutch Governor-General at Buitenzorg, in order to elaborate the materials he had collected in New Guinea. Notwithstanding the perils and hardships undergone during his first expedition, M. Miklukho Maklay proposed visiting New Guinea a second time, and, according to the last letters received from him, intended leaving the island of Java at the end of 1873. His intention then was to visit, and reside for some time in, Triton Bay.

M. Miklukho Maklay has already communicated the chief results of his anthropological observations to the Academician Baer at Dorpat. In the '*Natuurkundig Tijdschrift voor Nederlandish Indie*' for 1873, there appeared a very instructive article by M. Miklukho Maklay, under the title "*Anthropologische Bemerkung über die Papuas der Maclay-Küste in New Guinea.*"

More rich in geographical results has been the exploring voyage of H.M.S. *Basilisk*, under the command of Captain Moresby, along the south-eastern coast of this great island. Captain Moresby relates in his letter to Sir Henry Rawlinson, giving an account of his remarkable discoveries, that the *Basilisk*, having accomplished sooner than he anticipated the mission with which it was charged, viz., the suppression of the illegal employment of Polynesian natives by the pearl-shellery in Torres Straits, he employed his spare time in attempting to complete the unfinished survey of Captain Owen Stanley on this coast. The result was to find the eastern termination of the land very different in configuration from what it had been represented on maps, and further, the discovery of a magnificent harbour on the south-east coast. I need not dwell further on the details of this important voyage, which have already been published in our '*Proceedings*,' and will soon appear in a more complete form in our '*Journal*,' but I cannot refrain from alluding to the agreeable picture drawn by Captain Moresby of the native in-

habitants whom he found at this eastern extremity of New Guinea, and who appear to be totally different in race, as they are in the mildness of their manners and in their hospitable treatment of visitors, from the hostile Papuans of the western portion of the island. Instead of the uncompromising hostility with which strangers attempting to land have been generally met in other portions of the island, Captain Moresby says that, although on all possible occasions he gave his crew liberty to go on shore and mix freely with the natives, perfect good feeling and confidence prevailed on both sides.

This contrast between the races of the east and west has also been remarked on by the Rev. Wyatt Gill, who communicated to the Society early in the Session an interesting account of his three visits to the mainland of New Guinea from the Mission Stations in the islands of Torres Straits. Mr. Gill was fortunate enough to see the natives of both races on different parts of the coast, and to ascertain, by inquiries of the resident missionaries, the line of separation between them, which on the south coast is the Manumanu River. All the coast natives west of this river belong to the black or negrillo race, while east of this a light copper-coloured race, apparently of Malay descent, occupies the country. It was these latter with whom Captain Moresby had to deal, and he speaks in high terms of their docile disposition and their industry. Since these papers were read a strong reinforcement has left this country for the Mission Stations in Torres Straits, and a small coasting steamer, the gift of Miss Baxter, has been sent out to enable the missionary parties to explore thoroughly the south-eastern coast and ascend the rivers, with a view to adding to our knowledge of this wonderful country, as well as of selecting sites suitable for mission stations.

Whilst English explorers have been thus profitably engaged at the eastern end of New Guinea, more than one party of *savans* of other nations have been doing good work at the western extremity. Thus Dr. Meyer, a German naturalist, known for his former researches in the island of Celebes, has succeeded in penetrating a considerable distance into the interior, and is said to have crossed the isthmus between Great Geelvink Bay and McCluer Inlet, but we have not at present seen any detailed account of the proceedings of this enterprising traveller. A more prolonged investigation of the western peninsula and of the neighbouring islands, especially the Aru Group, has been made by the Italian naturalist, Dr. Beccari,

and his companion, Signor D'Albertis, the latter of whom has lately returned to Europe, bringing with him the valuable collections in almost all branches of natural history accumulated by their united labours, the chief part of which, I believe, is destined for the museum of Genoa, now under the management of the Marquis Giacomo Doria, himself an accomplished naturalist and a former fellow-traveller of Dr. Beccari. Beccari and D'Albertis explored together in 1872 the western coast of the peninsula near Dorey, and the mountainous country of the Arfak and Atam some distance in the interior; and Dr. Beccari in the year following devoted many months to the examination of the Aru and Ké islands, of the former of which he has sent home a sketch-map, furnishing a welcome contribution to our knowledge of this little-known group. Other Italian explorers are Signor G. E. Cerutti, who made a survey, in 1870, of the straits between New Guinea and the island of Salwatty; Commandante Lovera di Maria, of the corvette *Vettor Pisani*, who, in 1872 and 1873, further examined the same straits and the channels of the Ké and Aru islands. In connection with these important explorations by Italian geographers and naturalists, I ought to mention that the results have been admirably recorded and illustrated by excellent maps in the periodical work entitled '*Cosmos*,' conducted by our able Honorary Associate, Signor Guido Cora, of Turin.

AFRICA.—Africa has occupied by far the greater part of the attention of the Society during the past session, and on every side visible progress has been made towards filling up those large blank spaces on the map, which are still sources of such interest to the geographer and such a stimulus to the exertions of the enterprising traveller.

On the Western Coast, if the expedition against the Ashantees has not added much to our geographical records, it has materially quickened the interest attaching both to the Coast country and the Niger Valley. It has directed attention to quarters which are still unexplored, and effectually tended to lessen both the real and imaginary dangers of further exploration, besides leading to the publication of much information regarding the country.

The same may be said of what we have received from Sir Samuel Baker regarding his most adventurous expedition. The main parts of what he had done and discovered had been made known to us before my predecessor last addressed you, and since then you have had the great pleasure of welcoming Sir Samuel and the heroic partner of all his wanderings, and of hearing from his own lips, in

the lectures and addresses with which he has so liberally favoured us, and which are duly recorded in our journals, as much of the detailed history of his achievements as it would be possible to communicate without the publication of his work, which is so anxiously expected by all of us. Though the direct geographical results may be generally confined to the correct ascertainment of points previously visited by him, and the filling up by his accomplished relation and fellow-traveller, Lieutenant Baker, of many blanks in parts of the country which Sir Samuel had discovered in former journeys, most important service has been done to geography by proving the accessibility of regions which, a few years ago, were practically closed to European travellers; and we may every year hope for fresh contributions from those who are following in the path so energetically and successfully opened by Sir Samuel. The transmission by him of a letter addressed to Dr. Livingstone, which was forwarded across the Nile Valley, and reached Lieutenant Cameron at Unyanyembe, is in itself a fact of no small importance, geographically, as indicating the feasibility of transit by routes which had previously required all the energy of Burton, and Speke and Grant to traverse.

Yet more important is the fact which Colonel Grant has just learnt from a letter he has received from Colonel Gordon, that Lieutenant Cameron's reply to Sir Samuel's letter, and addressed to Sir Samuel at Gondokoro, had safely reached Colonel Gordon. It is thus clear that the King of Uganda, with whom Colonel Gordon's predecessor had established friendly relations, is able to insure the conveyance of letters from the outposts of the Khedive of Egypt to those of the Sultan of Zanzibar.

It is, moreover, clear from Colonel Gordon's letters that the difficulties in the way of reaching the lakes from Egypt have been greatly reduced since Sir Samuel's first most adventurous journey.

Colonel Gordon writes from Gondokoro 16th April, and Khartoum 4th May. His letter reached London 17th June—one day short of two months from Gondokoro. He had left Cairo 21st February; and Suez the 22nd; arrived at Suakim the 26th, and left 28th; arrived at Berber 8th March, and left the 9th; thus reaching Khartoum on the 13th March, or 18 days from Suez.

The "Sud," the great floating vegetable barrier, which so effectually closed the navigation of the river when Baker went up, had been cut through as Baker had suggested, so the route to Gondokoro was open.

Colonel Gordon left Khartoum the 21st March, and reached Gondokoro on the 10th April. In descending again from Gondokoro, he reached Kytch ($5^{\circ} 30' \text{ N. lat.}$) on the 10th April, and Khartoum on the 4th May—11 days from Gondokoro: but he believes it could be done in 8 days. He expects to have vessels on Lake Albert N'yanza in November.

In another letter, dated Khartoum 4th May, Colonel Gordon states that he had seen an embassy from King M'tesa of Uganda at Gondokoro, where they arrived four days previous to himself. They consisted of twelve Waganda and one Arab, and brought presents; amongst which was a cap worked by M'tesa's own hands. Gordon's baggage had not arrived, so he could make no suitable return; but he sent back all the slaves, his own cap, and some pictures, to M'tesa.

The Waganda witnessed Gordon's landing in state from his steamer at Gondokoro; they were shown the engine and furnace, and also had a sail in the steamer. On inspecting the sketches of Waganda in Speke's volume of the 'Discovery of the Sources of the Nile,' they were delighted when they recognised their own king, his mother, and other sketches with which they were familiar. Gordon tore out all the pictures and sent them to M'tesa.

The Waganda also brought two letters from Lieutenant Cameron, dated August and November last. These gave accounts of Dr. Livingstone's body having arrived, of Dillon's death, and Murphy's resignation. The Waganda told Gordon that Cameron intended to go by Karagweh to the north, and Gordon gave instructions that every assistance should be rendered to Cameron, should he reach Uganda. The King of Uganda sent for a male and female donkey, a man who would teach him to read the Koran, a writer, and a barber to shave him.

The great German Expedition to the countries north of the Congo has been fairly started; and their proceedings are regularly recorded in a publication issued by the German African Society, of which seven or eight numbers have already appeared.

The Expedition under Lieutenant Grandy, which was equipped by Mr. James Young, with a view to meeting Livingstone, should he have turned his steps westward, has hitherto not been attended with the results hoped for. Nor has the Expedition under Lieutenant Cameron as yet added much to our geographical knowledge, though it was effectual in affording to the followers of Livingstone useful aid at a critical part of their journey homeward with the body of

the great traveller. Lieutenant Cameron, when we last heard of him, had reached Ujiji, and, finding that he should not be able to travel west of the lake for some months, was preparing to explore by boat the south-western shores. The losses he had sustained by the death of his two promising companions, Dr. Dillon and young Mr. Moffat, and by the invaliding of Lieutenant Murphy, will be fresh in your recollection; but, from what I know of his pluck and determination, I entertain hopes of his yet achieving distinction and adding to our information regarding the lake-region by his single-handed exertions, should his health enable him to prosecute his journey.

Many gaps, of greater or less extent, have been filled up on the eastern side by Dr. Kirk, Captain Elton, Mr. St. Vincent Eschine, Père Horner, and others.

One of the great geographical events of the year has been the publication of Dr. Schweinfürth's Travels, the valuable results of which were glanced at in describing the grounds for conferring on that accomplished traveller the highest honour we have it in our power to bestow. The enormous amount of valuable information on so many subjects, which he has collected, assures me that in his future travels he will record those astronomical determinations of distances, which alone are wanting to render his work one of the most complete, as it is among the most suggestive of modern travels.

But the main interest of the year centres in the most important contribution to geographical knowledge which we have received for many years past, in the journals of our own Livingstone. Nothing can exceed the minuteness and careful accuracy, as far as his means went, of the notes kept by Dr. Livingstone. No less than 17 pocket rough-note books, filled with careful memoranda of each day's journey, were found among his papers; and whenever he made a long halt, he appears carefully to have written out his journal in a connected narrative, and to have plotted on map-paper every portion of his track. All the voluminous data thus collected, appear, as far as can be ascertained, to have been recovered, and are now in the hands of his eldest son, Mr. T. S. Livingstone, who is preparing them for publication; and a very cursory examination of their contents shows that they are full of the most valuable geographical information regarding the whole region between the third and twelfth degrees of south latitude, and the twenty-fifth and thirty-fifth degrees of east longitude. It is more than pro-

bable that when the whole is before us, and fitted in with the contributions of other recent travellers, we may find that much more has been filled up in the blank spaces of the map of Africa than we as yet are aware of. I have noticed very briefly, in the short sketch of the great traveller's labours, the salient points in his later contributions to geographical science, and we await the fuller information we hope for in his published journals.

Conclusion.—Such is a brief sketch of our proceedings during the past year. It gives, I hope, some ground for confidence in the inherent vitality of this great Society; but more than this, it is, I trust, one of the many satisfactory circumstances to which we may look as proofs of national vitality. It shows a substantial taste among large masses of our countrymen for all that pertains to geography; for exploration, however arduous; for scientific investigation, however intricate; and for faithful, honest record of failures as well as of successes. The taste for such labours cannot co-exist with a worn-out national nature, or with the causes of national decay. We all know how much this great Society owes to Royal patronage, and to the life-long labours of Presidents like Sir Roderick Murchison, to Associates and travellers like Livingstone; but Princes may found and foster with Royal bounty societies for the promotion of such studies, philosophers may instruct them, great travellers may make them the depositories of their discoveries, still the society cannot flourish, as ours has done, unless there be in the national constitution the vital springs of active national life; and from the day when Prince Henry founded the first Geographical Society on a weather-beaten promontory of Portugal, up to this moment, we find that such societies have flourished as the nation was vigorous and growing. And now, when this Royal Geographical Society of ours, approaching the first half-century of its existence, boasts itself as the parent of 33 similar institutions which have been founded in all parts of the world, since the Royal Geographical Society led the way, we find that everywhere they prosper as the nation prospers, and where the nation is weak or effete they are sure to languish. But while this vigorous vitality gives to our Society much substantial cause for satisfaction, let us look well to our laurels. Great nations, like France, Italy, and America, like Germany and Russia, have, since our Society was founded—44 years ago—established Societies of their own, whose activity gives to them the same evidence of national enterprise and

life as ours : and if we slacken our pace, either from indolence or self-complacency, we may be passed in the race.

It seems to me that the Society may well turn its attention in two directions. First, let us look to the qualifications of our travellers. No country possesses in such perfection the best raw material. The strong physical constitution, the buoyant energy (physical as well as mental), the keen power of observation, the good-humoured indifference to opposition and danger—the determination not to be beaten—are more common among our youth, more lasting among our seniors, than in most other races ; but there can be no doubt that this very abundance of natural gifts is apt to give us a dangerous contempt for artificial culture. How often have our working geographers lamented the neglect of systematic training by some of our most enterprising travellers ! How few have imitated Livingstone in his life-long devotion to his own education in all that makes an accurate observer, as well as an active explorer ! How rarely do we see men training themselves as Schweinfürth and Hildebrand have done, through years of preliminary travel and study, with their eye always fixed on some great future enterprise ! It is this which, to my mind, gives its special value to what has been so well undertaken by our associates, Mr. Galton and Mr. Brodrick, in connection with geographical studies in our public schools, and in which, at Dr. Acland's suggestion, we hope to interest our Universities.

But we must also take care that our own Government shall find good reason for supporting us when we have need of State assistance. In other countries the work may be done when you have once interested some great statesman in an enterprise of exploration ; but here, in England, when our great statesmen succeed to office, they are apt to distrust themselves, and are sometimes distrusted by their countrymen, in proportion to the strength of their convictions, or the clearness of their views, when projects of science come to seek assistance from the public treasury. Our Ministers are trustees for the public purse, and, most righteously, jealous guardians of their trust. Every proposal for State assistance is scanned as if it were a plot to rob the Treasury, and to gain their support it is necessary not only to carry with us the verdict of the scientific world, we must also bring to bear on them the convictions of great industrial classes, and the public opinion of the taxpayers. It is the more important to recollect this, because, in many of our great exploring enterprises, I look upon Government co-operation as

worth much more than the grant of public money. Few men are better trained for travel than the scientific branches of our army and navy (the *men*, let me observe, as well as the officers), and no personal enterprise can, especially in such arduous tasks as Arctic exploration, compensate for the lack of that strict discipline which is nowhere among us found in such perfection as in our national forces. While, then, we do all that is in our own power to train our travellers, let us relax no effort to carry with us the cordial sympathy of the people and the Government of our country.

We must not separate without recording in an especial manner our obligations to the University of London for the courtesy with which they have continued to allow us the use of this magnificent Hall for the meetings of the Society. The readiness with which this facility, whenever applied for, has been accorded us, is the more gratifying, as I feel assured that a body so careful of the interests confided to their charge, as the Senate of the University, thereby recognise the desire of the Royal Geographical Society to contribute in its own sphere to the sound and thorough education of the great mass of our countrymen.

PAPERS READ
BEFORE THE
ROYAL GEOGRAPHICAL SOCIETY
DURING THE SESSION 1873-74.

[FORMING VOL. XLIV. OF THE SOCIETY'S JOURNAL.
PUBLISHED MARCH 8TH, 1875.]

I.—*Recent Discoveries at the Eastern End of New Guinea.* By
Captain J. MORESBY, R.N.

[Read, November 24th, 1873.]

THE *Basilisk* left Sydney, December 8th, with orders to suppress the illegal employment of Polynesian natives by the pearl-shellers in Torres Straits. This having been easily and quickly accomplished, I found myself with much spare time on my hands, and resolved to employ it in completing, so far as our time, means, and ability would permit, the unfinished survey of Captain Owen Stanley of the south coast of New Guinea.

The information thus obtained I will divide into three sections for clearness:—

First Section. Islands and coast of New Guinea in Torres Straits.

Second Section. Coast of New Guinea between $146^{\circ} 20'$ and 148° E.

Third Section. From 150° E. to east extreme of New Guinea.

FIRST SECTION.

This is described in the following letter addressed to me by Navigating-Lieutenant E. R. Connor, an officer employed on the Queensland survey, who zealously volunteered his services to survey the north islands and shores of Torres Straits. He was detached in command of the *Basilisk's* pinnace, on this ser-

vice, for a period of over three months, and is therefore better qualified than anyone else could be to speak of those parts and their inhabitants. I would add, as a precautionary remark, the pearl-shellers having now for six years occupied Torres Straits, the savage characteristics of the natives have been much ameliorated by their intercourse with white men. Also Lieut. Connor having no knowledge of the copper-coloured races to the eastward, but intimately acquainted with the degraded Australian blacks, is far more favourably impressed with the black New Guinea men of Torres Straits than I am.

“H.M.S. *Basilisk*, at Sea,
2nd June, 1873.

“MY DEAR CAPTAIN MORESBY,

“I have much pleasure in giving you such information on Torres Straits and its inhabitants as I have gleaned during my cruising there. My knowledge of Prince of Wales, Horn, Banks, and Mulgrave islands, is limited to information received at Cape York, and interviews with such few natives as came across to Cornwallis in the pearl-shelling boats. Of the other islands and coast I speak from actual observation.

“The coast of New Guinea from Bristowe Island to the Talbot Islands, and as far west as I could see from there, is one mass of mangroves and scrub, the only rise being a hill abreast of Saibai Island about 200 feet high. I ascended the north-west summit of Cornwallis Island, on a very clear day, for observations, and had a splendid view for miles; but could see nothing but a vast flat.

“The only inhabitants seen actually living on the coast of New Guinea were those at Mowatta (a village at the mouth of the Katow River), and a few at Yanga, a village abreast of the Talbot Islands. These are described below.

“Saibai and the Talbot Islands are of the same swampy nature as the coast; there are, however, a few well-cultivated patches on both large islands.

“Cornwallis Island is most remarkable. It towers far above the others, and is of a quite different formation, being covered with large granite boulders; and its summit, 790 feet above the sea-level, is clothed with dark-green trees. Its east and south-west sides are steep, but on the north, or north-west sides, there are some considerable patches of fine grassy land where the natives have some very good gardens.

“Turnagain Island is low and swampy; there are no natives.

“Warrior Island is nothing more than a sandbank with a few stunted trees; its only importance consists of its being one of the head-quarters of the pearl-shellers, who have got an immense quantity of shell from the Warrior Reef. The natives

here are almost entirely dependent on their fishing for subsistence. They, however, make occasional trips to Bampton Island for yams, &c. The water supply is scant and bad, and, during the dry season, all the drinkable water has to be procured from Turtle-backed Island, whence it is brought in long bamboos.

"The Brothers, Cap, and Turtle-backed, form a group of well grassed and well watered islands, with a moving population whose head-quarters are at the Brothers.

"The remaining islands of Torres Strait—Prince of Wales, Jervis, &c.—are hilly, with much scrub. The natives of these islands bear a marked resemblance to those of Saibai, Morsatta, &c., in language and appearance; and, where not expressly stated, the following description is general.

"The natives of Torres Strait and coast of New Guinea are dark brown in complexion, with well-shaped heads, rich brown eyes, nose good, in some cases being aquiline, good mouths (facial angle about 65°); the eyebrows are well-marked, and follow the curve of the orbit. The hair, if allowed to grow, is crisp and woolly, but it is generally kept quite close cut. They also cut the hair of the face, leaving only a small beard. The headmen of the families wear wigs made of a skull of matting with long thin curls fastened in; they are wonderfully well made, and it was only on my second visit that I found the fact out, although I had been amongst the natives for 5 weeks on a former occasion. When the hair is allowed to grow they roll it up into small curls, plaster it over thick with clay and let it dry. When dry they tease the curls out and give the hair a coat of oil. The women invariably have the hair cut close, except a ridge which is left about half an inch long and same width, extending across the top of the skull from ear to ear. The average height of the men is about 5 feet 6 inches, and women 5 feet 2 inches. One woman at the Brothers was measured 5 feet $5\frac{1}{2}$ inches. The men are remarkably well made, their legs being especially good; and they display much skill in managing their canoes under sail.

"Polygamy is general, but not universal, but the practice of infanticide precludes any effort at finding out the relative number of the sexes. Few opportunities occurred for observing their diseases, but they suffer much from fever and ague, for which their treatment is novel. As soon as a man gets shaky they cut his hair close, and then bleed him well from the forehead. His back, arms, and legs, are also scratched pretty deep with a piece of glass or sharp flint. Ulcerated mosquito-bites are very frequent; and several cases of hydrocele were seen, but only five cases of elephantiasis.

"They live on the produce of their gardens, which are well kept, and contain yams, sweet-potatoes, and sugar-cane. At low water the men go out and spear fish on the reefs, and on moonlight nights go out in canoes and hunt turtle and dugong. The flesh of the dugong is very sweet, and much resembles veal. One night the men from Saibai caught seven, and the next night six, of these animals. They cut up the flesh and cook it at once over a very slow fire, by which means, and by re-cooking it each day to keep it dry, they preserve the flesh for as long as 10 days. After the first cooking it is served out equally all round. The gardens appear to belong to the various families, and all the work is then done by the women, who also climb for coco-nuts.

"The men are pretty constantly employed in making and repairing their canoes, making fish-spears, &c. The village of Mowatta alone supplies the whole of Saibai, Warrior Island, Brothers, Cornwallis, and Talbot, with bows and arrows.

"The canoes are fine boats, some being over 45 feet long, made of a single tree, with raised washboards. I saw a great deal of work done about the canoes during the time I was at Cornwallis. They get the logs, already dug out, from a village beyond Bampton Island, called Kewai. The washboards are cut out from the sides of old canoes, and the edges of the canoe and washboard are trimmed nicely. Holes are cut in each at about 3 inches interval, and a lashing made of plaited coco-nut fibre is rove. Along the joint they place a strip of split bamboo. By knocking this, round which the lashing is passed, they get a good purchase in the spring of the bamboo, as the lashing is hauled taut during the knocking. The head and stern washboards are joined by a shield-shaped piece of wood, and the joint is caulked by the inside bark of the mangrove, beaten up with a little water. The lashing goes over this, and as it soon hardens, the whole is quite watertight. Considerable taste is shown in ornamenting the canoes, devices resembling fish or stars being the most common. These are burnt out, and the edges trimmed and painted red or white. There is usually a staff in the stern, with a quantity of fine grass on it. The outriggers are very long and well stayed; the poles are about five feet apart, and on each side there is a platform, with wicker cages to hold spears, &c. They have two mat-sails, both forward and close together; when not sailing free they use a lee board under the lee bow.

"Their arms consist of bows, arrows, and tomahawks. The former are made at Mowatta, and exchanged for pieces of calico, yams, and sugar-cane. The bows are of split bamboo, very tough and heavy. The arrows are of reed, headed with hard wood,

and barbed with wallaby bone; they are all poisoned. This operation we saw performed: they take the inside bark of a tree, called by them *cangat*, chew it, and spit the saliva and juice out into a shell. A piece of charred wood is then mixed in, and the mixture is then smeared over the head of the arrow, two coats being sufficient. The bark is very acrid indeed. The men told me that if an arrow penetrates but half an inch, the wounded man dies in convulsions in a short time. Iron tomahawks are the only ones used, except in Prince of Wales and Horn islands. These, however, have only been quite recently used, as the old headman at Cornwallis showed me two skulls of his own killing, one of which had been smashed by an iron tomahawk and the other by a stone one.

"The men go naked as a rule, and the women have only a belt, with a bunch of grass in front and behind.

"Pigs and dogs are common about Saibai and Mowatta: the latter are quite different from the dingoes of Australia—the tail, instead of being bushy, is thin, like a pointer's or hound's.

"Although we noticed no distinct chieftainship, there are in every village some headmen who have command over the others, to a certain extent.

"The houses at Mowatta, Saibai, and one at Cornwallis, were all built on piles, and some of them at Saibai and Cornwallis had the lower part thatched-in, making a kind of day-room. At the Brothers, Talbot, Jervis, and Warrior islands they have only miserable sheds, made of branches and leaves. They all use tobacco, and the pipe is the usual large bamboo common to the South Sea Islands.

"Their ornaments are fillets of plaited grass, head-dresses of cassowary feathers, and plumes of bird-of-paradise. Many of them have pearl-shells, ground down to a half-moon or crescent shape.

"In disposition they are frank and open, but very independent. We had only two complaints of theft the whole time of our stay about there.

"Very little information was to be obtained about the men living inland on New Guinea, although I tried very hard to find out. The headman at Cornwallis, however, told me over and over again that they are '*very bad men*.' There seems to be a continual feud between them and the coast and island men. Not many months ago the men from Mowatta, Sabai, and Cornwallis surprised the up-countrymen one night, and killed over twenty men and women. They brought the skulls back and burnt them solemnly, after which a pile was made near the village. I enquired particularly if they ate any part of the body, but my question was met with an unqualified look of dis-

gust and a shout of 'No, no! bad!' so I concluded that, at least, the *coast* people are not cannibals.

"Such is the sum of my information, and I conclude, remaining, my dear Captain Moresby,

"Yours, &c.,

"EDWARD R. CONNOR."

SECOND SECTION.

Between Yule Island and Hood Point, 120 miles, the whole of this coast-line was laid down by the running survey of Captain Stanley in 1849; but it appears that the only point landed upon was the shores of Redscar Bay, where, after a very brief intercourse with the natives, symptoms of hostility were suspected, and the party at once returned to the ship.

The *Basilisk*, when about 25 miles E.N.E. of Yule Island, found herself at daylight off a vast extent of drift-wood and uprooted trees of a great size; they were first reported as *reefs*, causing considerable anxiety, until daylight revealed their real nature. This led me to suppose that inside Yule Island I should find a large river which might prove a road to the interior of New Guinea. This was my ambition.

Yule Island lies off the entrance to a large well-sheltered sheet of water (now named Robert Hall Sound), where the *Basilisk* remained several days.

The island is about 550 feet in height, well-cultivated and fertile. The mainland, excepting some bold headlands, is one vast extent of low swampy ground, extending for 6 or 8 miles inland to a low range of hills. These are backed up by range after range, until they culminate in the magnificent "Owen Stanley" Mountains, 12,000 or 14,000 feet high.

I was utterly disappointed in finding *no* river which led to these tempting highlands. A river we found, capacious and stately enough to raise our hopes extravagantly; but, after following its sluggish course for many miles, it led *nowhere*, and was but the drainage of the immense surrounding fresh-water swamp. A powerful river emptied itself into this first stream, but its current was too rapid to admit of my six-oared galley ascending more than a very short distance: it was probably the parent of the *drift* seen at sea.

The scenery on the river-banks was monotonous in the extreme—a dense growth of mangrove and other moisture-loving trees. Excepting flying-foxes and screaming gaudy-coloured birds, there was an entire absence of animal life.

Occasionally ill-made native huts were on the banks, from which a track through the swamp led to some acres of raised

ground, like an oasis in the desert. These were carefully cleared and cultivated with yams, taro, bananas, &c. Here also were permanent houses, built, as usual, on poles some 8 feet from the ground, with one room common to the whole family. The natives hid themselves in the swamp: indeed it must have appeared to them as if we had dropped from the clouds.

It seemed marvellous how human life could exist in such a malarious, vile place: even in the glare of a noonday sun the air was thick with mosquitos.

In "Robert Hall Sound" the ship was always crowded with natives, fresh parties from distant parts of the coast arriving each day. They are a copper-coloured race, combining both dark and light shades, decently clothed—the men wearing a breech-cloth, the women wearing the usual Ti-ti or South Sea petticoat. The men have their hair frizzled out as a mop, but the women cut theirs short, and extensively tattoo their bodies, which the men never do. They ornamented themselves with black, white, and red pigments, variously laid on, bunches of flowers; and bird-of-paradise plumes fastened to their heads and shoulders. Occasionally the great beak of the "*toucan*" was worn as *horns* on each side of the head; the men's mouths were all much disfigured by excessive use of lime and betel-nut. Their weapons are bows, arrows, spears, stone and wood clubs. They were totally unacquainted with the use of iron; infinitely preferred their stone hatchets to our axes. The barter they the most liked was the polished pearl-shells of Torres Straits.

None of their villages are visible from the sea, being placed in the bush in cleared spaces, very neat and cleanly kept. In the rear of the villages are generally extensive well-fenced plantations of yams, bananas, &c. No signs of cannibalism were visible. They gladly received us at their villages, and impressed us as a friendly, intelligent people; being so distinct a race from the black, naked New Guinea men of Torres Straits, it will be very interesting to ascertain *where* the line of demarcation occurs. It is probably not far to the west of Yule Island; for at Cape Possession (25 miles to the west), in 1846, Lieut. Yule remarks "that the natives varied in shade, from nearly a black to a light copper-colour;" or perhaps it may be at some spot where the *betel-nut* first grows, to the east of Torres Straits, which the black race never use, the light race always.

Some fine specimens of steel-sand were found on the mainland near the sea.

Redscar Bay is, during the south-east monsoon, a wild exposed anchorage; the surrounding country low, swampy, and malarious, intersected by many large streams flowing from the "Owen Stanley" range. I spent four or five days in vain efforts to

reach the mountains by means of these rivers; but in every case, after ascending 14 or 15 miles, when the country began to be somewhat open, the current became so rapid, and snags and uprooted trees so numerous, it was impossible to go further. Their banks are very similar to the rivers at Robert Hall Sound; they are more frequently fringed with what (for want of knowledge) I call a bastard palm—a palm without any trunk, which flung its gigantic leaf-branches 40 or 50 feet, arching over the rivers. Some smaller species were armed with innumerable hooks on the edge of the leaf, which lacerated us cruelly, as, trying to avoid the current, we kept close to the banks.

When clear of the swamps the rivers ran between dense tropical forests, the trees of no great girth, but towering to fabulous heights: I should say from 200 to 250 feet. Even this height could not save them from the destructive climbing parasites, which, reaching to the loftiest branches, destroyed their life, and hung round the dead limbs in the most weird and fantastic shapes.

The largest of these rivers was blocked up by an accumulation of logs and snags, which, interlaced together, had bridged the river, and, being continually added to from above, had formed large vegetated islands, under which the river rushed and foamed furiously. Just below these islands it was about 80 yards broad, 20 feet deep, and very rapid.

Not a sign of native life was anywhere to be seen, but at Redscar Bay we were given to understand that a powerful tribe lived inland, of whom they were much afraid.

Redscar Bay is the ill-chosen site of a Polynesian native mission, belonging to the London Missionary Society. The unfortunate teachers, little better than children themselves, and left to their own resources, are dying off rapidly.

Immediately to the east of *Redscar Head*, the outlying barrier reef rears itself to the water's edge, at a distance varying from three to eight miles from the shore, and guards uninterruptedly the coast as far as Hood Point from aught but gentle wavelets. Simultaneously with the appearance of this guarding reef the entire features of the country change. The whole coast between *Torres Straits* and *Redscar Head* is, as a rule, low and swampy, and has probably been formed during the course of ages by the alluvial deposits of the numberless large streams descending from the great Owen Stanley Range. Now precipitous, round-topped, grassy hills, openly timbered, and bearing a strong family likeness to each other, spring from the white coral and sandy beach. These hills are backed up by higher ranges inland. Fertile valleys lie between.

The coast is strewn with villages, always marked by a grove

of coco-nut trees. The houses are built after the Malay fashion, on poles, some standing far out on the shore-reefs in quiet waters, others clustering amongst plantations on the hill-sides.

It is singular this *sudden* change from a low, muddy, mangrove-bound coast, to boldness, coral-shells, and white sand. Perhaps it is caused by the *courses* which the rivers from the mountains take?

From Redscar Head to Hood Point not a single stream was seen emptying itself into the sea; small trickling rivulets were found, and *water-holes*—no clear running stream. The soil in the valleys is of a peaty, black, spongy nature, which probably absorbs the rain as it falls.

Close to the Fisherman Islands of Captain Stanley, the *Basilisk* passed through the Barrier Reef by one of those narrow, bottomless openings peculiar to these seas, and anchored in a fine roomy harbour within a harbour (now named Port Moresby and Fairfax Harbour), which our boats had previously discovered. The ship remained here some days, whilst running surveys were made and the coast explored.

In the neighbourhood of Port Moresby the valleys were intensely rich and tropical in their vegetation, but the hills, of which the greater part of the country consisted, were perfectly Australian in their appearance: they had very poor soil, covered with large stones, scattered gum-trees, and thin grass. On some of these hills large quantities of quartz were found; some of the specimens picked up being impregnated with gold, but no trace of gold was ever discovered amongst the natives.

The description of the Yule Island natives may generally be applied to the natives of this part of the coast, but these appear a more harmless and inoffensive race. I do not remember seeing more than one armed native during the month we spent amongst them. I frequently examined their canoes, trading up and down the coast for long distances and calling at distant villages, and found them equally destitute of weapons. Many of these canoes were of the kind described by Lieut. Yule, of H.M.S. *Bramble* in 1846, viz., double canoes, secured by a cane deck or platform passing over all and fastening the canoes together. They were propelled by large mat sails spread between two poles, in the shape of the letter V, and steered with long paddles; their length was about 40 feet, and extreme beam about 8 feet. No treble or quadruple canoes of this sort were seen by us.

In their houses they had rough-wood spears, and occasionally stone clubs, no bows.

We roamed over the country and visited their villages as freely as if they were English people. If any of our fellows

got lost in the bush, the natives took them to their villages, fed them, and offered every hospitality, before bringing them back to the ship.

Apparently they had never before seen a white man, as their curiosity was great to see and touch our white skins.

From their proximity to Redscar Bay they had learnt the use of iron, eagerly taking our axes in barter. Their fishing-nets, made from the fibre of a small nettle-like plant (I did not see its leaf) are precisely similar to an English seine, quite as strong, and are universally used from Yule Island to East Cape.

Wallabies were the only wild animals seen. Pigs and dogs the domesticated ones.

THIRD SECTION.

This commences at Heath Point, where Captain Stanley began his survey of New Guinea, distant about 40 miles from the (then) supposed south-east extremity. The chart shows an unbroken continuation of the Owen Stanley range to near the (supposed) south-east cape.

The north-east shores of New Guinea had never been surveyed, but all the charts agree in representing the eastern termination of New Guinea to be in the shape of a *wedge* with the D'Entrecasteaux Islands on its north-east board.

The reality we have found to be very different, as the rough tracing will show you. You will observe that New Guinea finishes its enormous length to the eastward in the form of a broad *fork*. Heath Point, of Captain Stanley, is a lofty island lying off the mainland: thus he in reality commenced his survey at the extreme south-east point of New Guinea without being aware of it. It was probably thick weather when his soundings were taken within two miles of Heath Island; under any circumstances, from the westward, Heath Island shuts out all view of the Straits named by me "*China Straits*."

The tracing will obviate my making any lengthened remarks on the unexpected configuration of the land which it has been our lot to discover. I will briefly say that the south-east extremity of New Guinea sweeps precipitously down from a height of about 2000 feet, to the tranquil shores of China Straits; those on the opposite side have Hayter Island, irregularly shaped, rising to a height of about 800 feet.

Hayter Island is separated by a narrow pass (riven asunder by some mighty convulsion of nature) from Mourilyan Island. This latter island is of a moderate height on its southern board, but to the north-east rises to about 1200 feet, and is separated

by Fortescue Straits from Moresby Island, a noble island with peaks about 2000 feet.

It is a curious question *how* it has come about that the mistake of supposing New Guinea to end in a wedge-like shape should have occurred. It may have been thus:—D'Entrecasteaux and the old navigators knew of the existence of the north-east fork, and placed their discoveries relatively correct with regard to it; they knew nothing of the south-east fork. Modern navigators, making the land from the south, knowing nothing of the north-east fork, and seeing the high land of that part of New Guinea over the low land of Mourilyan Island, hastily jumped at the conclusion that it must be D'Entrecasteaux Islands: thus confusion arose and the fork was *shut up*. It is clear enough now.

I am strongly of opinion that the route between China and Australia will eventually lead through China Straits: they are free from dangers, and have safe anchorage everywhere. A ship leaving Sydney would follow the outside route to the great north-east channel, a clear free sea, from that well-known track, leading to China Straits; thence to East Cape is a clear run. There the *Basilisk* was brought up by reefs. Unfortunately a want of stores and fuel prevented our looking for a passage (which will, *undoubtedly*, be found) to the south of *Lydia* Island.

I examined the northern shores of New Guinea, for about 25 miles, in my boat. Once round East Cape, New Guinea is washed by a grand, clear, reefless sea: a ship might literally sail with her sides rubbing against the coral wall which binds the shore, and find good anchorage in any of the bays where a beach is seen. *How far* to the westward this description would apply remains to be proved: it is an important matter, and well worth early investigation.

Of the beauty and fertility of these islands and shores of New Guinea it is impossible to speak too highly; in its general features it strongly reminded me of Jamaica. The precipitous wooded mountains are, to a considerable extent, cleared and terraced to their very summits with taro and yam plantations, in a way that even a Chinaman might envy; whilst the valleys produce coco-nut, sago-palm, bananas, sugar-cane, oranges, Indian corn, guavas, mammy apples, pumpkins, and other tropical productions. Mountain streams abound, and contain a delicious eatable fish, almost identical in taste and appearance with the English trout.

The torrents which discharge themselves from the mainland into Sir Alexander Milne Bay are very numerous and large; *no* fish were seen in these.

At the head of Sir Alexander Milne Bay fine specimens of steel sand were obtained. At East Cape the natives possessed large lumps of obsidian; but we did not see that it was used to barb spears or make knives, as at the Admiralty Islands.

The whole of these coasts, except where the mountains rise too precipitously from the sea to give foothold to man, which is often the case, are thickly populated.

The natives are of a lighter copper colour than those previously described, slightly limbed, and active, with bright intelligent features; many would be good-looking but for the disfigurement caused by the betel-nut. Their taste in painting themselves is peculiar; with charcoal and oil they at times make themselves a sooty black, others will paint black spectacles round their eyes, blacken their nose and lime their cheeks and chin white, giving themselves a most grotesque appearance. They are fond of wearing bright flowers, birds' plumage, and long ornamented streamers of the pandanas fastened to their shoulders. The septum of the nose was perforated and a polished bone thrust through. Occasionally they wore human jaw and spinal bones as bracelets and ornaments. The women wore their hair short, and were extensively tattooed; the men never.

They are fond of making pets of parrots, cassowaries, and different species of a sloth-like marsupial little animal, which, being somewhat like the Australian bear, we termed opossum-bears. One species, with a soft greyish fur, was very beautiful; we could not succeed in keeping them alive on board.

The men appear to do all the canoe work—fishing, and so on—leaving the field labour for the women; nevertheless, the women appeared to have their say, and make the men do as they pleased in matters of barter. The men were frequently seen nursing little children with much affection. A striking, distinguishing mark of the superior civilisation of the light-coloured race to the black New Guinea men is the acquaintance of the former with the art of common pottery. At all their villages various sizes of earthenware pots were seen, and others in the process of manufacture. They are neatly moulded by hand to the required shape, and then baked by heaping fire round the clay.

Their weapons are handsomely carved wood swords, clubs and shields, wooden spears and stone tomahawks, but no bows. They were perfectly aware of the value of iron, specimens being found in every village; doubtless obtained from the Eastern Islands, with which a constant communication is maintained by means of large trading canoes. These are from 40 to 50 feet in length, the bottom consisting of a hollowed tree, then

raised upon, the top sides secured by a strong cane lacing and large wooden knees; they are propelled by an oval-shaped mat sail, very skilfully handled, and quite capable of making long voyages. Meeting them at sea, the *Basilisk* going 5 knots, they easily sailed round us, and, luffing under our lee, were with difficulty prevented from boarding whilst we were under weigh.

The other canoes in use are small, and the catamaran is universal. Besides these, each village has several long, narrow, war canoes, highly ornamented after a barbarous fashion, carved and painted, capable of holding 40 or 50 men. They are kept very carefully hauled up under sheds, and bear the appearance of being but seldom used.

With these people our intercourse was of a most satisfactory, pleasant nature. At first they were a little shy; but this was speedily got over, and a free interchange of barter went on, pieces of hoop-iron being the great medium of exchange. They eagerly exchanged their handsome stone hatchets and other valuables for a piece of the coveted iron; many tons of the finest yams were also bought with it.

On all possible occasions I gave our ship's company liberty to go on shore, and mix freely with the natives; the results were all I could desire—perfect good feeling and confidence on both sides. Nor was there a single instance of our men insulting the women, or of the natives making immoral offers. The greater part of our surveys being done in boats, I had frequently occasion to land in my six-oared galley at large populous villages, 18 or 20 miles from the ship, surrounded by large crowds: yet we were always received in the same friendly, hospitable spirit as if in sight of the ship; nor do I think that they had any idea that we possessed weapons more powerful than their own.

They would, if possible, pilfer when on board, but, in bartering, were strictly honest. Take them altogether, they are as genial and pleasant a race of savages as could well be met: at the same time, I have no doubt they do a little cannibalism amongst themselves. They took pains to make us understand, as an event they were proud of, that they had eaten the former owners of the skulls (hung up in their villages) and human bone ornaments which they wore; but the skulls are few, and apparently of an ancient date. As they have a superabundance of food, I am inclined to think it is only on *very* rare occasions they make a raid or do any fighting amongst themselves. I never saw a wounded man amongst them.

I think it is very likely that the inhabitants of the large outlying islands stand very much in relation to the New Guinea men as the Danes and Norsemen of old did to the ancient

Britons. On one occasion, when lying in Fortescue Straits, we were visited by some large *Island* canoes: immediately they appeared all the New Guinea men cleared out, and were seen no more until the strangers had left.

We could not trace any sign of religious worship amongst any of these copper-coloured races, unless stringing up thousands of coco-nuts on poles fixed on the reefs in the front of their villages—in fact everywhere—may be regarded as a propitiatory offering. They never move out after dark, and, probably, like other savages, have a belief in, and dread of, devils and evil spirits, but no knowledge of any good spirits.

At Killerton Islands, before they opened a friendly intercourse, they brought a dog on board, and, after knocking its brains out on the quarter-deck, looked upon the rite as a ratification of friendship; at least so we understood it.

The natives appeared to be subject to a sort of leprosy and other skin-diseases; elephantiasis (so common in Torres Straits), or cases of malformation, were scarcely ever seen.

The meteorology of the coast of New Guinea from Yule Island to the eastward was found, during the months of February, March, April and May, to differ materially from that of Torres Straits. Leaving Torres Straits the first week in February, when heavy rains and occasional strong breezes, with dirty weather from the north-west, prevailed, we remained in the neighbourhood of Redscar Bay until the first week in March, during which time we only had one day's wet weather and strong breeze; all the rest fine, with calms and light variable winds.

At Cape York, again in March, a constant succession of heavy rain and dirty weather.

March 30th again at New Guinea, with lovely weather; and thus it continued, excepting two days' rain (April 27th and 28th), until we finally left China Straits on May 7th.

On May 10th, off Cape Suckling, the south-east monsoon set in strong with rain; this was immediately following after three days' dead calm.

At Cape York the south-east monsoon had been blowing steadily since the end of March.

The barometer has been steady at 29·80, or thereabouts. The thermometer has ranged between 82° and 88°, but the heat has rarely felt oppressive, and our ship's company, although they have served almost continuously for the last 18 months in tropical climates, and our boats' crews much exposed in surveying the rivers and coasts, have enjoyed general good health.

I could find no trace of the missing Russian traveller M. Micklucho Maclay.

II.—*Three Visits to New Guinea.* By the Rev. W. WYATT
GILL, B.A.

FIRST VISIT TO MAUAT.

[Read, November 24th, 1873.]

On a bright morning, the 27th of October, 1872, I first saw from our anchorage at Tauan, the low south-western coast of New Guinea, like a dark line drawn across the horizon. The vast unknown land was but four miles distant. One sympathised with the exultant cry of the immortal Ten Thousand on first catching a glimpse of the Euxine, *Θάλαττα, θάλαττα*.

About the same distance from New Guinea, but separated from Tauan by a narrow strait of $3\frac{1}{2}$ miles, lies the sister island of Saibai, as yet unmarked on charts. The chiefs of these islands are brothers. The inhabitants speak a dialect, and practise the customs of the mainland, and maintain a friendly intercourse with the people of Katau and Torotoram. And yet, perversely enough, the portion of New Guinea in sight is entirely inaccessible to strangers—the tribe occupying it being in constant feud with their neighbours on the mainland and on the adjacent islands.

Five teachers of the London Missionary Society greeted our arrival at Tauan. Next day the Rev. A. W. Murray and I sailed in a boat to Saibai, which is a low, fruitful, unhealthy, island. The interior is a vast morass, with myriads of snipes, curlews, &c., &c. The inhabitants are a fine Negrillo race, suspicious of strangers. The women here, and on the mainland, are excessively timid; they are slender in figure, wear a meagre grass petticoat, and have their heads closely shaved.

On Saibai and Tauan, the houses of chiefs and warriors are ornamented with strings of skulls of New Guinea bushmen. The owners of these ghastly trophies were very unwilling that we should touch these "malakai," i. e. ghosts. In the village stands a lofty coco-palm, with two branches growing out of the parent stem at the same point. All three crowns were richly laden with fruit—a botanical fact new to me. Their war-weapons and house-building are of a superior kind, precisely similar to what we afterwards saw on the mainland of New Guinea.

At daylight on the 29th of October, we steamed for Katau, a village distant some 20 miles on the south-western coast of New Guinea. As we passed along, the eye wearied of miles of stately melancholy mangroves, very unlike the scrub bearing that name I afterwards saw in Queensland. A conical hill, some miles inland, alone relieved the monotony of the scene.

The navigation of this unsurveyed coast is most critical. At

3 P.M. we touched an unknown coral-reef, without, however, receiving damage. Next day, a few miles further on, we discovered at low water sunken rocks lying in the direct path of the steamer.

Our proximity to Katau was indicated by an apparently interminable forest of coco-nut palms. The dwellings composing this village—the first we had seen on the main island of New Guinea—are but few in number, but of immense length. On the morning of the 30th we pulled ashore, unarmed, at the western mouth of Katan River. Our interpreters, Mamut and Joe, shouted to the chief Maino, and thus insured us a good reception. We were at once conducted to a covered place in the centre of the village. Unarmed natives crowded about us with smiling faces. The formidable Papuan pipe, sometimes 33 inches in length, was filled with tobacco-smoke, and politely passed round to the visitors, who however declined to swallow the fragrant vapour. This pipe consists of a piece of bamboo with a movable bowl. The smoke is drawn into the bamboo by applying the lips to the open end, which is then closed with the palm of the hand. The bowl is now removed, and friends are expected to inhale the fumes through the small aperture.

We discovered a second or eastern mouth to Katau River, thus making the somewhat elevated ground opposite to our first landing-place a picturesque island.

The village of Torotoram is larger than Katau. To reach it we had to wade more than half a mile over a bank of fine black sand. The entire population had fled into the bush, with all their valuables, excepting four or five men, who stood doubtfully in front of a house watching our movements. The very pigs had been taken out of the stys and carried-off. But, as soon as it became evident to the scouts that our intentions were pacific, and especially when they heard the voice of Maino calling to them, the whole adult male population came out of their hiding-places and gave us an unmistakable welcome.

Their canoes are invariably hollowed out of a single tree, and measure 45 feet in length. Each is furnished with a double outrigger, and three mat-sails. Mauat natives travel in entire families, and with all their worldly gear. In the centre of the canoe is a raised platform, on which they carry fire for the purpose of cooking fish, smoking, and for warmth at nights. In little square compartments on this raised platform they stow their property—fish-hooks, lines, firewood, women's grass girdles, &c., &c. In the body of the canoe are large water-jugs with lids. They often spend two or three weeks in fishing on one of the numerous coral-reefs near their coast.

They call us "Malakai," i. e. "ghosts" or "spirits." God is

spoken of by our teachers as "the true or great Malakai." The heathen of this part of New Guinea, and of the Straits, invariably associate the idea of *whiteness* with their notion of a spirit. Our gifts were elliptically designated "malakai," i.e. ("belonging to") glistening spirits." Very similar to this was the notion formed by the natives of the Mangaia, in 1777, of Captain Cook, whom they mistook for a god. The skulls ornamenting the houses of warriors on Tauan and Saibai are, as already remarked, called "malakai," i.e. (belonging to) ghosts." Such was their delight at seeing the whiteness of our skins that they would, had they been permitted, have stripped us in order to ascertain whether we were really white, and not, as some imagined, painted like dolls. One actually wetted his forefinger and vigorously rubbed my arm to see if the white would come off! They said we were the first whites that had ever landed at their village.

On leaving, all the men (110) followed us; some carrying food, others helping to drag our boat into deep water. The writer had a double escort of athletic natives, anxious to put their heads under his umbrella. When the food was finally deposited in the boat, and we were ready to start, these amusing savages simultaneously raised the right-hand palm open, and most gracefully bade us, "I auā" = "Farewell."

Not a woman, or child, or decrepit man, was seen by us all that memorable day. Those with whom we had such agreeable intercourse were the fighting-men of Torotoram.

We saw Bristowe Island in the distance. Several villages on the mainland, to the east of Torotoram, were pointed out to us by Maino. This part of New Guinea, from the western limits of the Katau district (indicated by a river opposite the uninhabited islet Kau) to Bristowe Island, is called *Maruat* by the natives themselves, and by the Torres Strait islanders.

Opposite to Bristowe Island is a deep navigable river, half a mile across, supposed to be a branch of the Fly. Captain Hastings went up 5 or 6 miles in search of a missing boat. He found no village whatever,—the entire country being a swamp. Yet there were evident traces of inhabitants; as here and there places had been cleared for canoes to rest at night, and baskets were still hanging on the lopped mangrove-trees. The river was swarming with crocodiles.

The aborigines of this part of New Guinea call their great island *Daudai*. Torres Strait islanders corrupt this into "Daudi," just as they corrupt "Torotoram" into "Tureture." Australia is known as "*Great Daudai*," New Guinea as "*Little Daudai*." Although we spent upwards of seven weeks in New Guinea waters, never once did we hear this famous island called "Papua."

The drums of the Mauat natives are, like hour-glasses, smaller in the middle than at the extremities. One end is invariably covered with iguana-skin. The other is open, but carved so as to represent a crocodile's mouth. A profusion of cassowary feathers usually adorns this remarkable musical instrument, which is about 3 feet in length. When struck with the tips of the fingers the sound emitted is very agreeable. But the songs accompanying the music are harsh and guttural.

Cassowary feathers (of which there seemed to be plenty) are also employed in adorning their grand canoes. I purchased a head-dress of these feathers intended for dancing occasions. In the centre of the forehead a stuffed bird-of-paradise (*Paradisaea apoda*) was inserted as a plume. Their name for the beautiful bird-of-paradise is "kakaiama."

At dawn of Thursday, October 31st, we parted from our kind friends on board the steamer, and sailed pleasantly in our own little boat along the coast, carefully noting the various indentations. Two small rivers empty themselves into the Straits opposite to two islets not marked on any chart. On one of these islets once stood a populous village; but the Saibai warriors almost exterminated the inhabitants, driving the miserable remnant into the primeval forest of the mainland. The smoke of their distant fires was distinctly visible in the clear October atmosphere; but prudence forbade our landing. Here and there tall mangroves actually grew out of the open sea—their wonderful roots of course resting in some unknown sandbank. We passed several stations for spearing dugong. In seven hours we reached Tauan, a distance of 25 miles.

We asked Sauai one day where the spirits of the dead go. Pointing due west, he promptly replied, "They all go to *Kipo*." He told us that "*Kipo*" is an island in the region of the setting sun, inhabited by disembodied spirits. One would imagine it to be a mythical name for Hades, in accordance with the almost universal belief of Polynesia, that the spirit-traveller follows the track of the setting sun, and descends with the sun-god Rā into the invisible subterranean world.

SECOND VISIT TO MAUAT.

We spent a week on Tauan, awaiting the arrival of a cutter chartered for the purpose of conveying teachers and goods to Mauat and to various islands in Torres Straits.

At last the *Viking*, a cutter of only seven tons, arrived. On the 7th of November this tiny craft, literally packed with passengers, sailed for Mauat. Besides the captain, there was but one sailor, who also officiated as cook. Yet, with the help of

our interpreter Joe and the teachers, we succeeded in boating up to Katau the same day, and anchored by moonlight in Katau River. A native stood on the brink of the river to inquire who we were.

At dawn we were roused by a chorus of strange bird-music from the densely wooded islet at the mouth of the river. Strange palms, of immense height, looked contemptuously down upon our diminutive vessel.

Mr. Murray and I at once went ashore to see Maino and the people, who were on the *qui vive*. All seemed delighted at the arrival of their two teachers. A house was at once allotted for their residence (but we advised them to build one for themselves as soon as practicable). In a short time their goods were safely stowed inside—the teachers themselves keeping watch. The wonder of wonders was the landing of the teachers' wives—the first stranger women that ever landed on Mauat. It was pleasing to note their curious, yet perfectly respectful behaviour towards these courageous women. This circumstance entirely diverted attention from ourselves, and afforded us an opportunity of meeting Maino and his brother alone, to impress upon their minds the duty of protecting the teachers left in their charge. "But what, Maino, if the wild bush-tribes should desire to molest them?" The chief smiled, and signified that his was the conquering tribe, asserting that his mere name was a terror to these bushmen. These Mauat men are a fine race, above the average height, but black. Their hair is woolly; their heads for the most part shaved. Their ears were universally slit, and elongated by means of weights, but with a regular series of holes, in each of which was inserted a short piece of the midrib of the coco-nut leaf. Their bows, upwards of 6 feet in length, are the best I have ever seen. They are made of male bamboo, highly polished; strips of which are used as string. These bows carry to a great distance. Their arrows are of reed, of which those intended for killing game (4 feet long) are pointed with hard wood, and, of course, are not poisoned; whilst those intended for war (5 feet long) are pointed with human bone, barbed, and dipped in deadly poison.

At midday we reached Torotoram; but had to wade ashore, as on the previous occasion. Auta told us that from the day succeeding our departure in the steamer he had begun to expect the arrival of the promised teachers. He vacated his own house for their accommodation. We therefore landed the two appointed to Torotoram at once; not, however, without considerable fatigue, on account of the long sandbank in front of the village.

During this visit I took a more accurate view of their dwell-

ings. Each domicile here, as at Katau, is of great length, built on lofty piles, and provided at each gable-end with a wide verandah and a ladder. To peep into one is like looking through a railway tunnel—light appearing at the other end through a small door. The object in building on piles is for security against crocodiles, serpents, and the annual inundations. In the wet season the natives are compelled to go to their plantations on the higher ground in canoes.

Their houses are thatched with the leaves of the sago-palm. We climbed up a rough ladder in the largest in Torotoram. The front verandah would seat a dozen adults. The flooring throughout was of cabbage-palm. From the verandah a door opens into the interior, on both sides of which are slight partitions of bamboo, large enough to admit a man and his wife, who sleep on the bare boards. No door or screen exists. A rough fireplace of clay is allotted to every pair of cribs, for warmth and to drive away mosquitoes. Close to each berth is a shelf for tinder (bark of the *Melaleuca*) and firewood, which is also available as a sleeping-place for a young child. For the elder children there is no accommodation in the house. To the best of our judgment there must have been inside this building accommodation for from sixty to eighty couples. The chiefs have houses of their own. In each Mauat village there are two large houses—one for boys, the other for girls. Elderly custodians are duly appointed to keep the inmates in order. This custom obtains on Saibai and Bampton Island (Bārama), proving those islanders to be colonies from "Little Daudai."

One of our party walked into the bush at Katau for 2 miles, among luxuriant plantations of bananas and taro. The country was almost a dead level; the soil of the richest description. It had been planned that we should penetrate into the interior at Torotoram to seek for a healthier location for our teachers. To our great chagrin the natives of this village would on no account allow us to leave the coast. Yet Auta had formally given permission. We endeavoured to buy over those who resolutely stood in our path; but to no purpose. They accepted our gifts, but still opposed our further progress, shouting, "Your feet will be bitten by serpents!" This was merely intended to deter us from pursuing the bush-path. We might roam along the intolerably hot, sandy beach as much as we liked. We afterwards learned that the women and children, with their treasures, were hidden in the very locality through which we had proposed to travel. In fact, only the fighting-men were seen by us at Katau and Torotoram on this, as on our previous visit to Mauat. The population of Katau may be estimated at 400; that of Torotoram at 500.

Some miles to the west of Mauat lies Baigo or Talbot Island. There is a considerable population at Baigo, all friendly to the teachers, who paid them a visit in a canoe from Tauan a few weeks before our arrival in the Straits. Several spears were hurled at the canoe at first, under the erroneous impression that it was a descent of their enemies. Kereseano and his companion were afterwards loaded with kind presents of food. The inhabitants of the mainland near Baigo are numerous, but by no means to be trusted. The drums of this district differ in form from those of Mauat.

THIRD VISIT TO NEW GUINEA.—REDS CAR BAY.

On Tuesday, November 19th, 1872, we hove anchor at Mer (Murray Island) for the eastern peninsula of New Guinea. We soon afterwards passed through Flinders Passage into the open Gulf of Papua, thus leaving awhile the most extensive coral-reef in the world, inside of which we had been sailing for two months.

On the 21st we sighted the lofty mountain range which forms the backbone of the peninsula—which in this respect strikingly differs from the low south-western coast. We passed a great number of palms drifting with the current, the stems and fronds literally covered with sea-birds. We were much pleased with the park-like appearance of Yule Island—clear, grassy spots alternating with picturesque clumps of trees. The island is 4 miles in length, and of considerable height.

We coasted along the mainland all that afternoon and night; and early on the following morning anchored in Redscar Bay, close to the islet of Varivara (the "Parivara" of the charts). A fishing-canoe, with five men, came alongside. With difficulty we induced some of them to come aboard. The canoe was far inferior to those of Mauat. On a raised platform they had large jars of drinking-water, a bundle of arrows, and a fire to cook any fish they might catch. A few presents delighted them. Lowering the *Woolahra* mission-boat, we followed the canoe up the "Booria," a salt-water creek. A canoe full of natives happened to meet us. All but one old man instantly rushed ashore, and hid in the bushes. Fortunately we had one of our original visitors with us in our boat; so that on nearing the little hamlet of Kido—with about fifty inhabitants—the natives, though evidently trembling, did not attempt to run away from us. We found them busy preparing their breakfast. Some of the women were tending earthenware pots simmering over a slow fire; whilst others were scraping long mangrove-fruits ere throwing them in. Another was nursing

her naked babe, the remarkable appearance of whose skin surprised us. The mystery was soon afterwards solved by seeing a woman come in from the bush with her sleeping infant in a fine fishing-net suspended from her forehead—the child's face touching her right side, its toes her left! We laughed heartily at this ingenious contrivance. Another female reclined on the floor, and with her right foot rocked to sleep a nude boy of two or three summers, who lay coiled up in a coarse, long net, suspended from the opposite rafters of their miserable dwelling. After distributing a few gifts, we walked nearly a mile into the bush, over a level, fertile soil. The few natives we saw were unarmed, and ran away at the sight of strangers.

On leaving Kido we wished to purchase a specimen of their pottery. Mr. Murray cut off a couple of red handkerchiefs for the purpose; but the sight of that gay colour drove them, like cattle, out of their senses. A general scrimmage began, the fair sex being the ringleaders, to get possession of these wonderful articles. By dint of firmness and good temper we pacified them by dividing the whole piece amongst the villagers. The Kido ladies gladly accepted the handkerchiefs, but declined to part with anything in return. It was evident, however, that we had won their good opinion, for they gave us a very hearty farewell in their own language.

We spent a couple of hours in investigating another salt-water creek, the "Nonoo River" of the charts. We fell in with a single family, fishing just inside Redscar Head. The man gave us to understand that they came from a village outside the bay, some distance to the south-east.

We now returned on board hungry and much discouraged, for we had been pulling about in the bay (which is 22 miles across) for hours under a tropical sun with no better result than the discovery of a miserable hamlet, built in a mangrove-swamp, where our teachers could not possibly live. Our real difficulty lay in the fact that we had no interpreter to elicit from the natives the information we required. Some Kido men had fortunately preceded us on board; from them the name *Manumamu* was repeatedly heard; but as they invariably pointed to the head of the bay, we concluded that it must be a long way off. We resolved to devote the following day to a search for this unknown village. Two extraordinary canoes, crowded with natives, bore down upon Varivara in the afternoon. Their appearance, in the distance, reminded us of paddle-steamers. They eventually anchored under Varivara, but took no notice of us. In all probability they were on a trading or fishing excursion to the Fishermen Islands. Several other great canoes came across the bay in the course of the

evening, and, like the two former, took shelter under the islet. Bright fires were kept burning on their decks all night. At 3 A.M., the wind being favourable, they started afresh on their voyage—fires burning, drums beating, and weird figures dancing; but, unluckily, the wind fell light, and after the lapse of several hours they could easily have been overtaken by our boat. It was not until sunset that we lost sight of these unwieldy crafts, that had at first filled us with admiration.

Late in the day the Kido men were taken ashore. Amongst them was an old man who had received a complete suit of clothes. On landing he took up his little boy, who, not recognising the sire in his new rig, cried bitterly. It was not until the old fellow set down the child and laughed heartily that the boy discovered his mistake and dried up his tears. Next day we pulled ashore in search of Manumanu. We walked a considerable distance along the shore of this immense bay, crossing a salt-water creek, designated "Manao River" in the charts. We were encouraged by meeting two or three natives, to whom we had previously given little presents. These introduced us to their companions, and smilingly led the way to the village we were in quest of. The first sure indication of our approach was a large enclosure of bananas. We now saw the mouth of Manumanu River, erroneously called the "Towtou" in the Admiralty chart. The unnamed river to the north in the chart is the true "Towtou," or, to spell it more correctly, the "*Toutu*."

Manumanu River is over a mile across at its mouth in November, which is the driest month of the year. A noble grove of coco-nut trees lined the opposite side of the river. A sharp bend brought us into a well-built village, consisting of a single long street. Delighted at the never-to-be-forgotten sight, we literally ran for joy into the evidently populous settlement. Two chiefs, "Koko" and "Auā," met us and led us to a sort of council-house, at the near end of the village facing the long street. We rested ourselves on the verandah, the interior of the house being filled with the notables of Manumanu, whilst the space in front was crowded with men, women, and children. The people seemed perfectly harmless, and were immensely pleased with their visitors.

We estimated the population of Manumanu at 900 or 1000. The village consists of ninety-four houses, all built on high stakes (higher than is usual at Katau and Torotoram). The houses are, for the most part, two-storied, whereas those at Mauat invariably consist of but a single storey. Everything was scrupulously clean. Swords of the saw-fish (*Pristis anti-*

quorum) were, in several instances, suspended in front of their houses as ornaments.

Our first impression of the Redscar Bay women was that they wore some tasteful close-fitting lace-like garment; but it proved to be merely the exquisitely beautiful tattooing with which they are covered. The men are but slightly tattooed on their faces and necks—exactly reversing what we had seen in Polynesia. The girdle of the men is made of the paper-mulberry, but is a mere pretence as a covering.

Especially were the women of Manumanu interested in the "Haine" (the captain's wife), who accompanied her husband on shore. Their evident fear at the first approach of our party now disappeared. We were permitted to wander about the village, to enter their dwellings, and to touch anything we pleased. A variety of little presents were made to conciliate them. Mrs. Websdale's dress was carefully examined. Some of the Manumanu "ladies" tried hard to obtain part of it. One woman pertinaciously insisted upon her exchanging her wedding-ring for a common mussel-shell!

The universal occupation of the women of this village is the manufacture of red pottery. With great interest we watched the entire process, from the mixing of two kinds of clay to the slow baking of the ware, which had been for some days hardening in the sun.

The complexion of these people is nearly the same as that of the Samoans and Rarotongans. In stature and physical strength they are far inferior. In general the Manumanu natives are under the average height: some would be accounted dwarfs. Their features are good, and the expression agreeable. The *men* dress their hair in a peculiar fashion—tied up so as to form a mop or chignon. Over the forehead is worn a head-dress of large red cockatoo-feathers, contrasting with another of short white cockatoo-feathers close to the former. A white cowry shell is often worn on the forehead. Long nasal ornaments are inserted in the septum, which is invariably pierced (in males) for the purpose. One foppish young man gloried in a nose-jewel curving outwardly, rendering the operation of kissing highly dangerous! The sailors nicknamed these nasal-ornaments "sprit-sail yards."

We saw no iron instruments in the hands of these natives: they did not even seem acquainted with the use of iron. A stone adze (of jade) was obtained in exchange for some red cloth. But when Joe tried to purchase a similar one for himself with some pieces of stout hoop-iron, the owner bluntly told him that the iron was useless, whilst their axes were *very good*. And really these adzes must be pretty serviceable, for on the

verandah of one house we saw a long plank 38 inches in width! Several were 24 inches broad. These planks were beautifully smooth. What labour must have been expended in dubbing them out! The adzes were fastened to the handles with strips of rattan, and not, as in Eastern Polynesia, with sinnet. Neither the Mauat nor these Manumanu natives seem acquainted with the manufacture of that valuable article.

Suspended from the neck of males and females were small but beautifully-netted baskets, as a repository for valuables, not unlike the reticule of a European lady. This is sometimes worn in front, sometimes behind.

We came upon a matron preparing the household repast. She seemed in no degree disturbed by our curiosity, nor did she invite us to partake of her hospitality. The viands turned out of the great earthenware pots consisted of cooked yams and half a good-sized pig. An immense lizard, measuring upwards of four feet, was resting on the live coals. It was cooked entire—claws, tail, and entrails! In every dwelling we found something stewing over a fire; but after the sight of the green lizard, although very hungry, nothing would have induced us to taste the contents.

Numbers of women and girls were filling their jars with water to drink, close to the village, thus proving the river to be fresh half a mile from its mouth. Some gracefully poised these jars on the head, whilst others carried them on the hip. Nearly a score of canoes were moored to the shore. The natives told us that we were the first white folks that had ever visited their village, and that our boat was the first that ever entered Manu-manu River.

At the farther extremity of the village the scene was enchanting. An island covered with timber divides the river into two principal branches. In the distance were magnificent ranges of cloud-capped mountains. From where we stood to the farthest shore was more than three miles, and this at the end of the dry season. What, then, must be the volume of water poured down from the interminable valleys of the interior during the rainy season!

On leaving, a great crowd of men, women, and children, followed us to the boat. The little boys waded up to their armpits for a final shake of the hands with the wonderful "haine," *i. e.* lady. Most of them presented her with wooden dolls of their own rude manufacture.

A sandbank, with two fathoms of water on it, lies near the entrance to Manumanu River. A rush of discoloured water, near the northern shore of Redscar Bay, indicates the true

entrance to the river. Beyond doubt, a vessel of light draught might go up to the village of Manumanu.

On Tuesday, November 26th, Captain Websdale and myself set off to explore Manumanu River. We started at 6 A.M., but did not reach the village till 8, the tide being against us. The teachers assured us that they had spent a comfortable night, undisturbed by natives, but that food was scarce. How different from the Mauat coast, where they loaded us with presents of food! A native begged of the writer a fragment of a coco-nut he had been eating.

Our object in calling at Manumanu was to obtain a pilot. An old man, with whom we had become very friendly, agreed to accompany us up the river. Our intention was to explore the principal channel, called by our guide the Veuru, but the old fellow earnestly dissuaded us from our purpose on account of some mysterious danger. Besides, he assured us that it would prove to be only an arm of the sea. To our subsequent regret we took our pilot's advice and pulled up the Wanaba, or eastern tributary, under the erroneous impression that the Veuru and the Wanaba would unite to form one noble river at the other side of the island. Ere this decision was arrived at we had passed the Abesi on the left, and the Mapu on the right.

As soon as Captain Websdale had finished carving the name (*Loalia*) of the yacht on a tree, we again started on our way, this time sailing pleasantly with a fair wind. The heat of the two preceding hours was sultry in the extreme, reminding me of days spent in the Gilbert Group just under the equator.

Flocks of wild ducks wonderingly gazed at us from long mud-flats as we glided pleasantly along the Wanaba. Two islets, well-wooded, narrowed the course of the river. Farther on, the Mareva, a considerable stream, branched out in a southerly direction. The river now became much narrower, and was called by our good-natured pilot the Taribadi. For a long while after leaving the peaceful village where our teachers had found a home, we saw nothing but the everlasting mangrove. At length the southern bank became comparatively open. It seemed to be lined with a dense grove of young coco-nut trees; but, on a closer approach, our wished-for coco-nut trees proved to be a gigantic species of palm, common throughout the Indian archipelago, but new to me. The fronds were nearly 30 feet in length, i. e. twice the length of a coco-nut frond; the fruit (I secured a specimen, weighing sixty pounds) closely resembled the fruit of the pandanus, only eight times larger. The flower, also, was gigantic. The leaves are identical with the well-known

fronds of the coco-nut—the midrib perfectly similar. Yet the *Nipa fruticans* never attains to any considerable height: it grows only in wet localities. I had previously picked up a quantity of seeds at the mouth of Katau River, without seeing the tree that produced them. The long leaves of this palm, carefully split into fine shreds, furnish the grass-like petticoat of the women of Manumanu. The oily kernel, of the size of a filbert, is eaten in times of scarcity.

The river now changed its direction from north to east, so that we felt certain that we had lost all chance of reaching the foot of the near mountain range in sight from the village of Manumanu, and which had first suggested the excursion. The river evidently trended towards the "Owen Stanley," being probably one of the many streams derived from its base. We had not sufficient time to explore this river to its source. Our object was simply to seek out the natives, and, if possible, to discover a healthier site for a mission station. Although the banks of the river gradually rose, the country was evidently inundated in the wet season: hence the absence of population. In our mortification we at first resolved to return, as it would be a long and weary pull against the tide into the middle of Redscar Bay. Curiosity, however, induced us to go on a little further ere we returned, and well were we rewarded, for now the scenery became exquisitely beautiful. A great variety of trees grew, not too thickly, on either bank. Vines and creepers innumerable hung in graceful drapery from the loftiest branches. Overtopping all were what we at first mistook for ancient coco-nut trees—sure sign of human vicinage—upwards of 80 feet high; one had fallen across the river, ready to be borne into the ocean by the next freshet. Again we were doomed to disappointment, for it proved to be the *Kentia procera*, with its great clusters of berries for fruit, found in New Britain and other islands in the Indian Archipelago. On the opposite bank grew a strange-looking dwarfish palm, bearing fruit. Fan-palms raised their graceful heads here and there. A large vulture, with a white neck and a very disagreeable loud croak, soared high overhead. Hawks were in hot pursuit of smaller birds that sought safety in the recesses of the forest. A tiny bird, at first mistaken for a large butterfly or moth, amused us by darting in and out of the long grass overhanging the river in search of insects. The hoarse voice of the cassowary was heard in the distance; and the cry of the cuckoo reminded us of home.

At 2 P.M. we camped on a high grassy bank hedged in by tall delicate tree-ferns, a leaf of which was as long as our boat. We were 7 miles from the river's mouth. The Taribadi was here

40 yards across, and 8 feet deep. Our camping-ground was very moist, apparently having but recently emerged from the great annual flooding. For some time our guide could not be induced to leave the boat, through fear of the "bulom," i. e. crocodile. We asked him the length of this dreaded foe: his measurement proved to be 30 feet. When at length the old guide saw us eating, hunger overcame fear, and he sat down with us to luncheon.

Our way home was pleasant, as we were in a great degree shaded from the rays of the hot afternoon's sun by the dense forest. We landed at Manumanu to say good-bye to the teachers. A number of strange natives were pointed out to us: they had that day arrived in canoes from seven villages on the opposite side of the bay. All these villages are anxious to have teachers. Thus the object for which I had left the yacht early in the day was providentially realised after all. Excluding Kido, as being too insignificant, there are now in Redscar Bay alone no fewer than eight villages, with a probable population of some four or five thousand, open to the labours of the Christian evangelist.

An hour after sunset, guided by a lamp at the masthead, we got on board, and found that our friends had been anxious on our account. Another, and, to confess the truth, a *tearful* farewell in parting from the teachers who came to take back the boat, and we were ready to start at dawn for Bampton Island, near the entrance to the Fly River, on our return voyage. We had succeeded in landing teachers on the south-west and on the south-east coasts of New Guinea proper, at points somewhat more than 260 miles apart, and had met with only kind treatment from the natives.

It was nearly noon ere the wind favoured us on Wednesday, November 27th, 1872. As usual, we rose before the sun—this time in the hope of obtaining a farewell glimpse of the magnificent mountain range which forms the back-bone of the eastern peninsula. Two lower ranges intervene between it and the sea-coast. Mount Owen Stanley stood out in all its glory, 13,205 feet above the level of the sea—the impression upon the imagination being deepened by the excessively low coast-line. But a little to the E.N.E. rises a still loftier mountain, the highest peak in a range at the back of the Owen Stanley. This magnificent mountain is some thousands of feet higher than Owen Stanley: but one cannot speak certainly as to its height, as a cloud invariably rested on its summit. At our first anchorage, our position was highly favourable for viewing it; but unfortunately, by moving into the middle of the bay, the yacht came in a line with Owen Stanley. It is due to Captain Webs-

dale to say that he first drew our attention to this majestic mountain; and thenceforward we daily looked for the occasional pleasure of admiring its solitary grandeur. It was not until the day of leaving that it occurred to any of us to sketch its form; but it was obscured in cloud. Mount Owen Stanley was distinctly visible; but its loftier companion behind was hidden in haze.

The eastern and western coasts of New Guinea are inhabited by races which differ in colour, language, the partial use of clothing, the chewing of the betel-nut, and in the treatment of their women. The women of Redscar Bay are by no means a down-trodden race.

We were interested in tracing a likeness between the dialect used by the Manumanu natives and the Rarotongan language. In the Hebrew, *consonants* are the essential part of the word; in the middle and eastern Polynesian dialects the consonants are constantly changing, the *vowels* being the essential part of these (if one may so express it) *invertebrate* languages:—

S.E. New Guinea.	Rarotongan	English.	S.E. New Guinea.	Rarotongan.	English.
Haine	Vaine	Woman, wife.	Oi	Koe	Thou.
Wanua	Enua	Land.	Ia	Aia	He.
Hai	Ai	Fire.	Rarua	Raua	They two.
Mata	Mata	Face, eye.	Tamona	Tui	One.
Utu	Ngutu	Lip.	Itua	Itua	Two.
Tupuna	Tupuna	Ancestor.	Toi	Toru	Three.
Ac	Vaeao	Foot.	Ani	A	Four.
Mate	Mate	Death, dead.	Ima	Rima	Five.
Pata	Muata	Great.	Taura toi	Ono	Six.
Niu	Nu	Coco-nut.	Itu	Itu	Seven.
Tou	To	Sugar-cane.	Taura ani	Varu	Eight.
Fetu	Etu	Star.	Tu	Iva	Nine.
Rau	Au	I.	Koauta	Ngauru	Ten.

Where do the Papuan and Malayan races meet on New Guinea? We *know* that all the coast natives *west* of the Fly River are black, and that the Redscar natives are a light copper-coloured race. The point of contact, then, must be somewhere between the Fly River and Redscar Bay.* We saw one black man at Manumanu—a visitor from a village lying to the west—strangely contrasting with the crowd around him.

We saw no gold whatever in New Guinea; and feel inclined

* A recent letter from the Rev. A. W. Murray states that the dividing line on the south between the two races is the Manumanu River—all villages to the west being Negrillo, and all villages to the east being Malay. This interesting fact satisfactorily explains the repugnance of our guide to permit us to visit the country west of Manumanu River.

to disbelieve the stories about specks of the precious metal being seen in specimens of native pottery. A story of this kind, invented by sailors on board the *Surprise* a few months since, originated the disastrous *Maria* expedition. In the numerous specimens of New Guinea pottery we have examined, there were no indications whatever of gold. I filled a bottle with the sand used by the women in making earthenware. It was heavy and glittering; but has been pronounced by assayers of gold to be entirely destitute of minerals, being composed merely of pulverized shells. Nevertheless, I fully believe New Guinea to be rich in minerals, because it is in reality a mere extension of Australia. Little Daudai is separated from Great Daudai only by a shallow strait, which is continually traversed by canoes.

Emboldened by our success, a small party sailed up to the village of Manumanu some weeks after our visit. They spent a week in exploring that neighbourhood: the result being the *certainty* that the arm we went up is the true river of Manumanu, the Veuru being only an arm of the sea. They penetrated about a mile further up the true river than we did, and saw in the distance a village; but were afraid to hold intercourse with the inhabitants. Their hopes of finding gold were entirely disappointed. They suffered greatly from intermittent fever, and were glad to get back to Somerset alive.

In regard to Bampton Island, the sad intelligence has just reached us that, despite their protestations of friendship, the natives murdered the entire missionary party shortly after our departure, and doubtless ate them. How little did we anticipate so melancholy a termination of our voyage!

III.—*Notes on the Western Islands of the Pacific Ocean and New Guinea.* By EDWIN REDLICH, Master of the Schooner *Franz*, 1872.

[Communicated, through the Admiralty, by Captain JOHN MORESBY, R.N., H.M.S. *Basilisk*, 1873.]

Banks Islands—*Ureparapara or Bligh Island*.—WENT on shore on the west side of the island, found the natives very hostile; they fired at us with arrows, some of which were poisoned, and we had to make use of our firearms in self-defence.

Solomon Islands—*San Christoval Island*.—Circumnavigated the island, and found the natives inoffensive, but to be everywhere cannibals.

On Thursday, 6th August, 1872, anchored in Makira Bay. This is an excellent harbour; good water may be easily procured. H.M.S. *Blanche* had left this place a few days previous to my arrival. With Mr. Perry, a resident of Makira, and Wapenoco, the chief of the Makira tribe, and four South Sea islanders as a boat's crew, I went out to shoot rabbits at an island not far from the harbour.

In leaving the bay we met with several large war-canoes, and pulling alongside one of them, found it to contain a dead body, dressed and cooked whole. Perry took it quite coolly, as an every-day occurrence; and at seeing me greatly horrified, and my boat's crew with their stomachs turned, said that he had seen as many as twenty bodies lying on the beach, dressed and cooked. Those in the war-canoe had two prisoners with them in it—a boy about 14, and a girl 13 years of age. Intending to save their lives, I offered to buy them, but without avail. The blacks went to Makira, sold half of the body there, and the remainder to another tribe, and sold both the prisoners. In the course of time I came across two houses, in which were kept the skulls of those they had eaten. I saw a considerable number of them.

Simbo or Eddystone Island.—The entrance to the harbour is on the west side, between a low, outlying reef, slightly vegetated, and the mainland—easily found out. After the entrance is made out, follow the coast at a cable from the beach, taking care to give the point which forms the inner harbour a somewhat wider berth, and then steer into the harbour; there is sufficient depth in the middle for a ship of any size. I moored my schooner to the trees there. Natives friendly, but cannibals, for I found again skull-houses well stocked. A great quantity of ducks on a salt-water lake, about 15 feet above the level of the sea. In some parts the water of this lake is almost boiling, on account of subterranean fire. Smoke issues through the fissures of the rocks in many places, at which the natives cook their food. We watered here at a small rivulet, which perhaps dries in the hot season. Found out that even here kidnapping had been carried on. A great deal of rain, thunder, and lightning during my stay here.

Sunday, 1st September.—At 1 P.M. sighted New Britain; from Simbo Island to here experienced three-quarters of a knot current to south-west per hour; perfect deluges of rain fell, with thunder and lightning frequently.

2nd.—At 8 A.M. found ourselves, per compass, 12 miles distance off Cape Orford; the land is very high, and in this bearing a remarkable red spot appears on the cliffs, resembling a cutter under full sail. Steered for St. George Channel; found

it a clear, fine, and wide, passage. Could detect no dangers of any kind.

New Britain—Duke of York Island.—Anchored in the north-west bay in 15 fathoms. The Duke of York Group consists of several islands, intersected by narrow salt-water channels. The natives swarmed the vessel. Kidnapping had not been carried on thus far; they are friendly, and willing to barter. Fowls and pigs are very numerous and cheap: three small plugs of tobacco for a pig of 30 lbs. weight; half a plug for a fowl. Plenty of yams and taro. Natives are cannibals, according to their own confession.

New Ireland—Portland Islands.—Found the islands well inhabited; estimated the population at 150. No passage through the islands, and no anchorage. Islands very poor, the northernmost only has some coco-nut trees on it. Natives apparently friendly; they dip their hands into the water and bare their heads when proposing friendship. Saw no signs of cannibalism.

Admiralty Islands.—11th.—Sailed among the islands, south of the large island. We were surrounded with canoes, in some of which were twenty-two men. These canoes have a kind of fighting-stage, furnished with large bundles of spears ready for use, that are neatly made, and headed with a kind of flint-stone. The natives besmear their whole bodies thickly with a mixture of red ochre and coco-nut oil; they are a superior race to those of the Solomon Islands in feature, as well as in intelligence, are of a copper colour, and have rather long wiry hair. The greater part of the male population wear the "bulla ovum," or a wrapper, but in the latter case they have the shell in a small bag round their neck; the women are decently clad with a grass petticoat down to their knees; they make well-shaped wooden and earthen vessels. The houses are better constructed and kept cleaner than at other islands. The natives came in very large numbers, but I did not like them very much, and kept six men on the look-out, with loaded muskets, to let the natives plainly see that I watched them, and was prepared for them. All went on peaceably, and without disturbance.

Sailed from here round the large island on the north side of this, and found several good openings in the encircling recesses between the outlying islands, and pretty well-sheltered anchorages. I like these natives far better, and was several times in the midst of them. I believe them to be inoffensive and honest. To judge from the admiration and surprise they expressed when they pulled up our trousers and saw our white skins, I conclude that they cannot have been close to a white man before. Had several times a whole crowd on board, and almost every day

some of the most seemingly influential men at my table, and they behaved quite decently, especially at the island which the natives called "Andra." I formed a sort of friendly intercourse with the chief. At dinner he would watch closely how we used our knives and forks, spoons, and so forth, and imitated our doings so nicely and decorously that he could safely have passed for a man that had been acquainted with those things from childhood.

L'Echequier Islands.—Sailed along the east side of the islands, found no passage; tried to get round the north-easternmost island, but did not succeed. A strong current drifted us towards a reef, and I could see, though a dark night, high breakers on both sides, and a passage in the middle. A land-breeze sprung up and took me off again, but towards the morning, during heavy rain and thick, calm weather, the current swept us on to a reef close to an island, about 2 miles from the position from which we saw the reefs and openings some hours before. At daylight we saw that there was really a deep-water passage, and also one on the other side of the island, and that we had struck on a projecting point of the reef which forms the two passages.

It is a flowery coral-reef: on one side we saw the dry reef, and on the other blue water of unfathomable depth. Thought the vessel would become a wreck. Sent a party on shore to build a house for ammunition, provisions, &c. The natives had all fled from the island. In the mean time sent the blacks under the ship's bottom, with crowbars, hammers, &c., to break corals. Had all sails set; after some time the men succeeded in clearing the rudder, and now worked with a good will and new hopes. I could feel the ship now and then settle down 6 inches and more with a crash, when one of the large mushrooms had been broken.

At 11 A.M. a breeze fortunately sprung up from the land, filled our sails, and the vessel slid off into deep water. The men in the water gave three hearty cheers, which were responded to by the house-building party on shore, and all came on board.

As soon as we got off, the wind died away again, but the current drifted the vessel clear through the northernmost passage. From here we ran for about 6 or 8 miles among a cluster of islands, and came to an anchor in 6 fathoms, pretty well sheltered. We have counted fifty-three islands, but very probably there are more. Natives very shy; all fled from their islands in canoes as soon as they sighted a boat. Three women came on board, who appeared to be at their greatest ease, and, after feeding them and giving them presents, they rather reluctantly left the ship. If I had remained longer after this, I

feel sure that the natives would have come to the ship with confidence. They are of a dark copper colour, long, stringy hair, delicate figures, and reminded me very much of Chinese. Found a good passage out, and steered for the coast of New Guinea.

Galewo Strait and Salvatti Islands.—On the 10th November came to an anchor off a small island, which the natives called "Sorön." There is a large settlement of Malayas and Papuans, who fly the Dutch colours, and are the immediate subjects of the Rajah of Salvatti. On the 12th November sent the two large boats, with eighteen men all told, for a three weeks' cruise, fitted out with all necessaries. My chief mate, Mr. H. Schlueter, a native of Hamburg, had the command. I could not send more men, as eleven were laid up with the climatic fever.

Friday, 6th December.—Boats not back, which made me very uneasy, all the more as I had received tidings that the two boats had been seen three days ago not far from Sorön, which information, however, proved to be erroneous afterwards.

Saturday, 7th.—Boats not back. To-day a Sorön native told me that a canoe had come from the southward with the news that the boats had been seen steering towards a place on the mainland of New Guinea, where the natives are very treacherous, and known to be very dangerous. The same Sorön man told me that a man-of-war was lying at Gilolo. I concluded at once to man a boat and send it in search of the two missing ones. I engaged two natives from Sorön Island to act as pilots.

Thursday, 12th.—Late in the evening the whaleboat returned; they had not seen anything of the boats. I had given the man in charge of this boat a letter, in which all the particulars are stated to the captain of the man-of-war, but the ship had left when my messenger arrived at Gilolo. Found out afterwards that it was an Italian man-of-war. Friendly natives had told the men that the two boats had been seen steering towards the land, and that they had not returned. They all expressed their opinion that the men must have been murdered. I could not leave this place without having tried all and every means to ascertain the fate of my men, and I concluded to ask the Rajah of Salvatti for his aid. Weighed on the 13th December, and arrived at Salvatti on the same day, but found that the Rajah was away on a cruise.

Sunday, 15th.—The Rajah returned, and from the account he gave me respecting the ferociousness of the Papuans, I lost the last hope for the safety of my unfortunate men. The Rajah granted me every assistance, and I supplied him with firearms; but he declined my company, as he thought it would place his weak party in danger.

Saturday, 21st.—The Rajah returned, and brought back six guns, a double-barrelled breech-loader, one revolver, the mate's watch, totally broken, his jacket, a compass, and a cartridge-pouch. He had recovered them in the bush, and expressed an opinion that the men had been cooked and eaten. I could not make up my mind to leave this place without having been on the spot myself, and tried to persuade the Rajah to render me his assistance. At last I succeeded, and the day for starting was fixed for that day week. In the mean time, we prepared for the expedition, made cartridges, and practised our blacks with firearms.

Monday, 30th.—The Rajah came on board with three prows, containing forty-five natives, and all their war implements. I went in the chief's prahu, my steward, a Singapore Malay, and a Fiji boy. The second mate, with two men, went in another prahu; and another Fiji man in a third prahu. All had joined the expedition voluntarily, and the firearms were equally distributed. In the evening we anchored at English or Saili Point.

Tuesday, 31st.—Went from Saili Point about 12 miles further down the coast. In going down, several prahus, belonging to different places under the Rajah's authority, had joined our party, which now amounted to nine prahus and about 120 men.

Wednesday, January 1st, 1873.—Went along the coast for at least 20 miles to two small islands, about 8 miles distant from the mainland. The native name for these islands is "Efmatal." This part of the coast of New Guinea is greatly obstructed by shoals and reefs. At about midnight got under way from there, and steered eastwardly towards the mainland.

Thursday, 2nd.—We have made now at least 2³ from Salwatti, and we now steered into a large and beautiful river, named "Crabara." Pulled very fast till 11 o'clock at night, when we anchored; and I presume we were then at least 30 miles up the river, which must go a long way inland. It is here half a mile wide; the banks are adorned with luxuriant vegetation. Here the whole party divided; some remained at anchor, and some went further up the river.

Friday, 3rd.—This morning two of the prahus, with three bush natives whom they had caught, returned. One of them, according to his own confession, had been actually engaged in the murder of my men, and boasted of having killed the "white man." He said that the two boats had been seen lying at anchor at Efmatal Island. Three canoes from the mainland, in each canoe fifteen men, had gone off with bananas, pine-apples, &c., which they gave to my men in the boats, and then quietly paddled off to the coast. They had behaved quite

friendly, and put the mate and men off their guard. The New Guinea men had counted the number of men in the boats, the arms, &c.

The next night the savages returned, and landed at the back of Efmatal Island. They found the men, with the exception of two boys, who had been left in the boats, camped on shore by their fires. They had divided into two parties, a little apart. The New Guinea men crawled upon them, and killed them in the twinkling of an eye, without even a cry being raised by the victims; after that, they killed the two boys in the boats, and then brought the latter to a place which nearly dries at low water, and here they burnt the boats. The savages took all the bodies up the River Crabara. There they cut off their heads, kept them for trophies, and sold the bodies to a neighbouring tribe, who had cooked and eaten them.

The three prisoners were horrible-looking fellows, especially the one who had helped to murder my men. They are a different race to that inhabiting the more civilised parts of New Guinea, and easily distinguished, and if I ever go there again I will not give them a chance of coming near me if I can help it. After the prisoners were well secured, all the prahus went further up the river, and I hoped that we should go to the village "Crabara," which is about 12 miles further up. After having gone up for about 6 miles, we heard the shells and drums right and left in the bushes. The Rajah then commanded a retreat, for he said they might come down on us by thousands, and we made the best of our way down the river.

Saturday, 4th.—In the morning we anchored at Efmatal Island. The cannibal was brought on shore to the exact spot where he had killed the mate, and in front of where the boats had been lying at anchor. He was lashed to the very tree under which he had killed the mate, and was shot there and then. I fired the first shot, and the second mate the second, with which he dropped down dead. As soon as he was dead the natives cut his head off, and strapped the body to the branch of a tree, as a warning example to other cannibals, who will certainly visit here now and then. All the men had witnessed the execution, and the Rajah had given his sanction to it.

The two other savages remained in the Rajah's hands, and both died a most horrible death. I witnessed the execution of one of them. He was, in the true sense of the word, cut to pieces by women and children, the widows and orphans of those who were killed in the first expedition, when the Rajah went out and recovered my guns, &c.

Monday, 6th.—Arrived at Salvatti. Stated the whole affair in several letters, and left them in the Rajah's hands. One

letter directed to the captain of the first man-of-war calling there; the second to the Prussian Consul-General in Hamburg; the third to the Sultan of Ternate; and the fourth to my present owners, Messrs. Barron and Austin, of Sydney.

Aru Islands.—Dobbo Harbour.—Tuesday, 21st.—Came to an anchor in Dobbo harbour in 8 fathoms. In coming from the westward or northward the harbour is easily made out. The openings between Wassia, Ougia, and Wokan islands represent two wide, open gaps; the third opening is between Wokan and Wama islands, and forms the harbour of Dobbo. The shallow water in the entrance shows very distinctly, and is poled out. A dangerous reef exists off the south-west point of 'Trangan Island, at least 8 miles off the land. I passed over a patch where the sea was breaking; could see distinctly the bottom, and think there could not be more than 2 fathoms.

It was blowing hard, and I came on the reef quite unexpectedly, which prevented me from sounding. From the topsail yard I could see discoloured water for a long way off.

IV.—*Geographical Notes of the Khedive's Expedition to Central Africa.* By Lieut. JULIAN A. BAKER, R.N.

[Read, January 26th, 1874.]

HAVING had the honour of being entrusted by Sir Samuel Baker with the topographical department, in the late Expedition of His Highness the Khedive of Egypt for the suppression of the slave trade, I venture to submit to the Council of the Royal Geographical Society the following Report of the countries visited during the expedition.

Of the journey from Cairo to Khartoum it will be unnecessary to speak; but, on arrival at Khartoum, we found that there were no vessels ready for the shipment of the corn and stores requisite for the Expedition, nor for the steel boats designed by Messrs. Samuda for the navigation of the great lake Albert N'yanza. Giaffer Pacha, the Governor-General of the Soudan, being urged by Sir Samuel Baker, at length succeeded in hiring thirty-one boats, with which we started on the 8th February, 1870.

Previous to leaving Khartoum we heard that the White Nile was choked up just above the junction of the Bahr Gazal, and that the stoppage extended for an immense distance, entirely obstructing the navigation of the river. This stoppage or "sud" is mentioned by Sir Samuel Baker in the 'Albert N'yanza, Great Basin of the Nile,' vol. ii., p. 329 *et seq.* It was

then in its infancy, but during the lapse of years had assumed its present gigantic proportions, which are every day being increased by the deposit of fresh vegetable matter by the river above. The traders, we were told, were obliged, in consequence, to travel by the Bahr Zaraffe, or Giraffe River, which is an arm of the Nile, leaving it in lat. $5^{\circ} 20' N.$, and meeting it again in lat. $9^{\circ} N.$, about 36 miles above the confluence of the Sobat.

During the last year we were told that the Bahr Zaraffe also had become obstructed, and that there were very shallow places in it, over which the boats would have to be dragged. By all accounts, however, the extent of these obstructions was very small, ranging, amongst a number of informants, from 30 to 100 yards.

We passed Fashoda, lat. $9^{\circ} 54' N.$, long. $32^{\circ} 26' E.$, on February 14th, 1870. This is a most unhealthy spot, surrounded by marshes. It is governed by a Bey and garrisoned by 400 men, all of whom have been sent here for punishment. After taking in some further supplies, we started again, and passed the Sobat on the 17th February. This grand river was then bank-full, and about 250 yards wide, running with such a strong stream that it banked up the Nile, the water of which was quite dead for some distance above the junction.

We arrived at the mouth of the Bahr Zaraffe on February 18th, 1870, and travelled for 272 miles up this river. At the mouth it was about 60 yards in width, but at this point it had decreased to about 20 yards. There was a raised piece of ground here, about 10 feet above the river, on the right bank, which was called by the Arabs a "dubbah." I subsequently took the latitude and longitude of this place. About a mile above the "dubbah" the river was entirely lost, and we came to a stop in the middle of high grass, without a vestige of a channel in any direction, and no signs of water even from the masthead. Here the guide declared himself to be at fault, and we were consequently obliged to return for 80 miles, where we found our fleet coming along slowly, being towed by the men on the bank. Having taken a fresh guide we proceeded again to the "dubbah," the fleet arriving before us, owing to a fair wind.

On March 8th we began to cut a passage for the boats, and on March 13th we were obliged to take the paddles off our two steamers, as the channel was too narrow to allow the paddles to revolve. The channel was cut in the following manner:—The men were placed along the line where the grass grew thinnest and the water was deepest, which was easily found by sounding with a pole pushed through the floating mass of some five feet of tangled roots and slime, and then, armed with swords, they commenced to cut through this mass, the men stationed on each

side hauling the grass out, and throwing it on to the bank which was thus formed. When the channel was sufficiently cleared, the grass forming the bank was tied back to the green grass on each side, to prevent it from rolling back into the channel again. This sort of work continued till March 29th, a few lakes intervening. We then reached the clear river, and proceeded for 13 miles, the water getting shallower and shallower, until at last Sir Samuel Baker's little dahabiah, drawing only 2 ft. 6 in. of water, could not go any further. Taking the dingy, we found that a little further on there was not water enough even for her, and she had to be dragged over a sandbank. Beyond this, the water was nowhere more than 2 ft. 6 in. deep, and our vessels required 4 ft. We were too late in the season. We ought to have started from Khartoum in the end of October, when the northerly winds commence to blow, and the river is high; but, owing to delays in Cairo, we had only started from Suez on December 5th, 1869. It was necessary to return, and Sir Samuel Baker had noticed a place on the right bank of the Nile, 6 miles below the junction of the Sobat, as a suitable place for a camp in case of necessity. Sir Samuel Baker called the officers and explained the circumstances to them, and we sadly, but the Egyptians gladly, turned our boats' heads down stream for the return journey on April 3rd, 1870. There were two "dubbahs" at this place, one on each side of the river, and a third one a little further back on the left bank. The river had fallen so rapidly, and the grass had closed in so much, that we did not get back to the "dubbah" till April 10th. Here we again mounted our paddles on the two steamers, and steamed down stream, arriving at the Nile on April 19th. We met Mr. Higginbotham, the chief engineer of the Expedition, on April 21st, with eleven boats, bringing up the sections and machinery of one of the steel steamers of Messrs. Samuda.

On April 25th we chose a place on the right bank of the Nile, 6 miles below the Sobat junction, as a station in which to pass the rainy season. Sir Samuel Baker named this place "Towfikia," in honour of the Viceroy of Egypt's eldest son, Mahomed Towfik Pacha. I fixed the lat. $9^{\circ} 25' \text{ N.}$, long. $31^{\circ} 24' \text{ E.}$, variation $7^{\circ} 45' \text{ W.}$ Iron magazines were erected, and all our goods and merchandise for traffic with the natives were placed under shelter.

During our stay here, we heard from the Shillooks (the natives of this part of the country) that they knew of a channel by which to pass up above the obstruction of the Nile. Sir Samuel Baker accordingly made preparations for an exploring expedition to ascertain if this were really true. A steamer and noggur (Nile boat) were loaded with picked wood of the best possible

description (Sunt, the *Acacia Arabica*), and, on August 11th, we started.

On August 12th, 1870, after having travelled about 95 miles from Towfikia, we turned out of the main river, up which we had been steering W.N.W., into a large branch west by south. This channel twisted and turned about very much; but at last, after a good deal of trouble in cutting through grass, we got into the Nile again, on August 14th, which was running about two miles per hour, and was 160 yards wide. I will here insert some extracts from my journal:—

Sunday, August 14th, 1870.—Steam up at 5.50 A.M. We had to cut through the passage that the dahabiah took yesterday, and got into the Nile at 8.30 A.M., then had to wait until the steamer had filled up with wood from the noggur (Nile boat).

“At 1.30 P.M., got under way, leaving the noggur to wait for us. At 1.40 P.M., a mountain bearing N.N.E., about 40 miles distant. 2.40: The river divides, one branch coming from the west, the other from west by north half-north. We took the west branch 4.30 P.M., finding the river closed, numerous tofes (floating islands) obstructing the passage in different places, we returned. Water shallowed to about 5 ft. 6 in.

“At about 5.5 P.M., turned off to examine the other passage. Finding this difficult of approach, anchored for the night at 5.25 P.M.

“*Monday, August 15th.*—Went in the boat to try and discover a passage. Found the large river close to us on the west, running about three knots. Sir Samuel Baker went off in another boat to the north-west, and found evidences of the traders having passed there—pieces of rag, &c., lying on the broken grass.

“Got under way at 10.30 A.M., and got into the river almost immediately, without any trouble. We went on for about four miles, steering west-half-south, and then found the river closed up. A large sheet of water, however, was to be seen from the masthead, extending from the west to north-west. We found a small passage large enough to admit the boat, and through this, with some difficulty, we proceeded until we arrived in this lake, which at this point was about two miles wide, but apparently much wider to the westward, there being there a sea horizon. We then returned, there being no practicable passage for the steamer, and came back to where we had started from this morning. Here we again took the boats to search for another passage, but without success. Sir Samuel Baker then determined upon cutting a passage into the large lake that we got into this morning, and for that purpose steamed up the river again, and

anchored, at 6 P.M., opposite the small channel up which we had gone in the boat. To-morrow we shall get all hands to work, and cut through.

"Tuesday, August 16th.—Raining in the forenoon, but after breakfast got all hands to work, and began cutting a passage. Cleared about fifty yards on the lake side, and then, as it was getting late, knocked off work for the day.

"Wednesday, August 17th.—Set to work at 8 A.M., and worked till 10 A.M., then from 2 till 5 P.M., by which time we had nearly completed the passage.

"Thursday, August 18th.—A blowing morning, too cold to allow the men to work in the water; but, after breakfast, set to work and finished the passage.

"Friday, August 19th.—Up steam at 6 A.M., and attempted to get through. Shallow water, however, delayed us for a long time. We breakfasted at 2 P.M., and then at last got through at 4 P.M.: had the dahabiah in tow at 4.5 P.M., and proceeded. A river coming into the lake from the southward, stopped at 5.25 P.M. to examine it, but found it choked. Anchored for the night at 6.15 P.M. in a little harbour to the southward.

"Saturday, August 20th.—Steam at 5 A.M., under way at 5.20 A.M., and proceeded to the westward, following the curves and bends of the side of the lake. At 6.5 A.M. set the course E.N.E. to return, having arrived at the farthest limit of the lake. At 6.45 stopped as we neared the passage through which we had come, and turned off to examine the northern shore of the lake. This lake is about 15 miles long, and varying from 2 to 3½ miles in breadth. Skirted round the lake till, at 8.40 A.M., we again arrived at the little harbour that we started from this morning. Started again at 8.50, and five minutes afterwards turned into the river that we had looked at yesterday. Stopped the steamer here and went up the river in the boat, but found it stopped up about a mile from the lake. Lost our way in coming back, as the different hors (channels) are so much alike. Got back at 11.15 A.M., then proceeded to skirt the southern shore. Turned off from this at 1 P.M., to examine a large hor or river on the north side, which Sir Samuel Baker had seen this morning. Arrived at the entrance at 1.25 P.M., and proceeded up the hor till 2.45 P.M., when it was completely blocked up. Observed that another arm of this lake ran nearly parallel with the arm we had steamed up, the water of which we could see to the westward at this point. No stream perceptible. We immediately returned to the point of confluence of the two arms, and turned up the other arm at 3.20 P.M.

"Stopped at 4.20 P.M., and after consulting the reis Omar, who said that we were long past the junction of the Bahg Gazal,

turned the steamer's head round to return. The upward course of the Nile from the Bahr Gazal being S.S.E., we must have passed that also, as our course up this arm has been W.S.W. It would be of no use going any further along this arm, which appears to extend an immense distance, as we should evidently be only going further out of our way, and burning fuel to no purpose. No stream at all. The whole of this lake, and these arms, of which there are several, are simply the accumulation of the overflow of the waters of the Nile, which extend in every direction in the shape of hors, the country being so perfectly flat. Stopped at 6.5 P.M. at the mouth of this hor.

"*Sunday, August 21st.*—Started at 6.5 A.M.; stopped at 6.37 A.M. opposite our cutting, in order to let the dahabiah pass first. Cutting bearing from mouth of river S.S.E. Got through the cutting at 7.5 A.M., and proceeded. Arrived opposite the noggur at 9.20 A.M., the average course having been east by north. Got through here without trouble, and having filled up with wood from the noggur, proceeded at noon. At 1.35 P.M. turned off into the Nile: 4.35 P.M. stopped to land our Shillook guides opposite their village. Proceeded again at 5.35 P.M., and arrived at our station at 12.30."

I made a small map of this part of the Nile, but was unable to fix the positions astronomically, as there was no dry ground anywhere, and the grass was from 10 to 12 feet high. Although we had actually passed the original obstruction or dam by a side channel, we had found the river blocked up 20 miles above this by a new formation, the extent of which it is impossible to estimate. This had no effect upon the stream, which oozed out from under the floating grass, and, in the main channel of the Nile, ran from 2 to 2½ miles an hour, being perfectly clear and free from vegetable impurities. It became necessary for Sir Samuel Baker to go to Khartoum, about 700 miles from Towfikia, in order to hasten the departure of some more boats laden with the sections and machinery of another steamboat of Messrs. Samuda. Whilst there, I took the opportunity of rating the chronometers, and with them determined the longitude of Fashoda and Towfikia.

On our return to Towfikia we found that the river had risen to such an extent that our camp was surrounded with water, and most of the cultivation was flooded.

On November 5th, 1870, the river attained its maximum, being 14 feet 3 inches above the level on our arrival on April 25th. It fell a quarter of an inch on November 6th. The northerly winds had not yet commenced to blow steadily, but Sir Samuel Baker arranged everything so as to be ready for a start as soon as they should commence.

On December 1st the first division of 8 boats was started off, followed by others every day, until the last division with Sir Samuel Baker started on December 11th. We had steamed for 150 miles up the Bahr Zaraffe, and were cutting wood for the steamer, when some of our boats that we had passed arrived, and told us that a vessel loaded with machinery had sunk just opposite the Sobat River. Steam was got up immediately, and we started back, taking three boats with us. We met the Colonel in command of the troops, who had been there when the accident happened, but had not made any attempt to save the vessel.

We returned to Towfikia, and persuaded the King of the Shillooks to help us with a number of natives. While these were being collected, we went a short distance up the Sobat, where there was a suitable place, got the masts and cargoes out of our three vessels, and towed them with the steamer down to the wreck, which had about two-thirds of her masts above water, lying close alongside the west bank of the Nile, with the whole force of the stream of the Sobat rushing down upon her. Chains were passed under her bottom, and hove upon from the vessels, which were nearly filled with water. Upon baling out the water, she, of course, rose slightly, and men on the bank, assisted by the natives, hauled upon hawsers and secured her to anchors which were laid out on the bank for that purpose. By repeating this process, after working hard for two days and a half, she was safely hauled up on the bank, and baled out dry, when it appeared that the caulking had come out in several places. The valuable cargo of machinery was saved without damage.

These Upper Nile boats are most curious specimens of naval architecture. There are no ribs, but the planks are laid one on top of the other, and large nails are driven in diagonally from both sides. They are caulked with rags from the *inside*, and the seams are not payed with pitch. In consequence, the rats, which swarm in all these boats, pull out the rags, and the boat is constantly leaking, and every now and then there is an accident, and a boat sinks.

We arrived at the "dubbah" Bahr Zaraffe, on January 7th, 1871, and I fixed the latitude $7^{\circ} 47' N.$; longitude, $30^{\circ} 22' E.$ Our old channel that we had cut the year before was now tolerably open, but gave us a good deal of trouble.

We arrived at the three dubbahs on January 29th, and I got lat. $7^{\circ} 32' N.$, long. $32^{\circ} 23' E.$ From this point we had the greatest difficulties from the shallowness of the water and the obstructions of the grass. In some places every available man had to turn out to haul each of our fifty-nine boats over a shal-

low place separately, and on one occasion we had to increase the depth of a channel, 500 yards long, from two feet to four. This, of course, was the work of many days, during which time the water was sinking two and three inches per day. It at last was so low, that when after an immense amount of labour we got our fleet into a small lake, the mud oozed up above the surface of the water, as the last boat was dragged in. We prepared to make a dam behind the boats, to enable us to push on. Mr. Higginbotham, the chief engineer of the Expedition, had a number of stout posts, 4 inches square, driven into the bed of the stream, behind the last boat, backed up by a similar row behind them, with struts from one to the other. In the mean time, 500 corn-sacks were filled with sand and earth to form a foundation for the dam, and the soldiers and boatmen mixed grass and mud together into large balls, which were piled on each side of the river in great heaps, ready to be thrown in on the word being given to commence the dam.

On March 13th, 1871, they set to work and threw the sacks and clods of earth into the river just above the framework, pounded it down with their feet, and in a short time made a most effectual dam. The water rose directly, and our fleet was afloat again. Still there was a great deal of hard work to be done before we got into the Nile, which at length we did on March 19th.

On April 15th, Sir Samuel Baker, with his dahabiah in tow of the steamer, arrived at Gondokoro, the last boats of the fleet not arriving till May 20th, having been delayed by foul winds and calms. A station was formed here, which Sir Samuel Baker named "Ismailia," in honour of His Highness Ismail Pacha, the Khedive of Egypt. Lat. $4^{\circ} 54' 30''$ N.; long. $31^{\circ} 46'$ E.; var. $9^{\circ} 8'$ W.; elevation, 1526 feet.

Ismailia is situate upon a cliff about 25 feet above the river; it is on the east bank, and is the only spot suitable for a camp. It has its disadvantages, however, being bordered on two sides by marshes, and on the third by the river. The effluvium from these marshes, after the river has risen and fallen again, is horrible, and gives rise to a good deal of fever; but, during the season of the low Nile, it is healthy but hot. During the rainy season, the Nile does not rise gradually, as might be supposed. It is subject to a series of sudden flushes, which, rising in about ten or twelve hours to a height of 4 feet, fall again, in about the same time, to the original level. The maximum height of floods at Ismailia is not more than 4 feet 6 inches above the lowest level. This rise always takes place after heavy rains have been observed to the southward, and is caused by the immense volume of water which the Ashua, Unyama, and other

streams bring down from the upper country, to say nothing of the vast quantity which pours into the Nile itself from the high mountains which line its western bank.

At Ismailia itself the rainfall is very uncertain, and the crops of the natives in the immediate vicinity are often destroyed by drought. I attribute this to the attraction of the rain-clouds by the mountains which lie at a considerable distance, as Belinian to the south-east, Lardo to the north, and Kerek and Kunifee to the south-west. Rain is constantly seen falling at these mountains, where the cultivation is naturally productive; but at Ismailia it frequently happens that the natives have to buy corn from their more fortunate neighbours.

The soil throughout the Bari country is poor and sandy; the natives are therefore obliged to manure the ground heavily to make it produce their crops. They till the ground with a sort of hoe, shaped exactly like the ace of spades, which is fixed to a handle about 9 feet long. This is pushed before them as they walk, cutting the roots of the grass, and just scuffling the surface of the ground. The corn is then sown, and the weeds left on the ground until the corn has sprouted, when they are gathered into heaps and burnt. The natives are a fine active race of men; well armed with bows and arrows and lances. Few of them carry shields.

The women are decently dressed in a sort of kilt made of dressed leather, but the men are naked. They are of a very intractable and treacherous disposition, and cannot be prevailed upon to serve as porters.

When the time came for us to depart from Ismailia for the interior, we found that we could not procure porters to carry our 50-foot steamer of 10-horse-power up to Ibrahimeya, at the point of junction of the Unyama with the Nile, so, forming a small station at the highest navigable point of the Nile, in lat. $4^{\circ} 38' N.$, we pushed on to Loboré, a place that Sir Samuel Baker fortunately knew of, from his former experience in the country. Here we obtained porters, but not in sufficient numbers for the transport of the steamer. However, we got enough to bring on a considerable quantity of merchandise for traffic with the natives. These porters went back to our station on the river in lat. $4^{\circ} 30'$ under the escort of forty soldiers, and in a few days returned, bringing the baggage.

From Ismailia to Loboré the soil is very poor and sandy, but beyond Loboré it is exceedingly rich, and produces large crops of dourra (*Sorghum vulgare*). Loboré is in latitude $4^{\circ} 1' 30'' N.$ I could not fix the longitude by astronomical observations, but I believe it to be accurately laid down in my map by bearings.

From Loboré to the Ashua River, at the junction with the

Attabbi, a distance of 27 miles; the soil is rich, but the country very thinly inhabited, owing to the depredations of the slave-hunters. The natives speak the Madi language, as also do the Loboré people, but with dialectic differences.

At the confluence of the Ashua and Attabbi, the River Ashua is about 130 yards wide, with a sandy bottom, and when we crossed it on March 1st, 1872, and also on March 24th, 1873, it was about knee-deep. Both above and below this point it is full of rocks, and is everywhere a most dangerous and formidable river in the wet season. The natives manage to cross it near Fatiko, with a rope fastened to the trees on each side, which must be laid across in the dry season.

From the Ashua to Afuddo, at the junction of the Unyama with the Nile, the route lies over hills of about 1000 feet above the surrounding country, and is stony, and covered with low open forest of scrubby trees. Upon descending the hill on the south side, there is a beautiful position for a station, on the stony dry ground just to the north of the Unyama, and east of the Nile. Close to water, but perfectly dry, with every facility for cultivation in the wonderfully rich soil on the banks of the Unyama within a short distance, and with an unlimited amount of wood for fuel in the adjacent forests, this place offers advantages for a station that very seldom occur. The latitude is $3^{\circ} 34' \text{ N.}$ I was unable to fix the longitude astronomically, but by bearings I am confident of its being rightly placed in the map. From this point the Nile is navigable into the Albert N'yanza, therefore Afuddo, or Ibrahimeya, as Sir Samuel Baker has named it, will be the great dépôt for all the ivory that comes down from the shores of Lake Albert N'yanza. Here Samuda's steamers will have to be constructed after they have been carried up in sections from Ismailia, and from there they will take their departure to navigate the lake. Ibrahimeya will become the capital of the country. The road from Ismailia to Ibrahimeya, 120 miles, is for the greater part of the way suitable for carts, the soil being very hard and sandy. Between Moogi and Loboré (14 miles) there is forest, through which a road will have to be cleared, but a few hundred men would very soon accomplish this.

Continuing the journey over an undulating country, for the most part covered with forest, we arrived at Fatiko on March 6th, 1872. Fixed the position, lat. $3^{\circ} 2' \text{ N.}$; long. $32^{\circ} 37' \text{ E.}$; var. $8^{\circ} 30' \text{ W.}$; elevation above sea-level, 3542 feet. The natives of Fatiko speak the Shooli language, in common with the people of Lira and Umiro. The men usually wear a skin slung over their shoulders in such a manner as to form an apron, and the married women wear a long tassel behind, and a triangular piece of leather in front, but the unmarried girls are perfectly naked.

Both men and women work in the fields. The hoe is similar to that used in the Bari country; but instead of being mounted in the same way, it is fixed to a short handle in such a manner that



the hoe is nearly at right angles with the handle. This makes a very powerful instrument, and with it they dig into the soil a considerable depth. They never manure their land, but sow the same ground one year after another, getting good crops every time; such is the wonderful richness of the soil.

The dry season lasts for two months, January and February; and during the rest of the year the weather is very much like the summer in England, but hotter. It may rain for two or three days successively, but rarely all day. It generally comes on to rain in a heavy shower, lasting from half an hour to three or four hours, and then clearing up. There are frequently five or six days together without a drop of rain, even in the middle of the rainy season. The whole country is beautifully watered by streams which run into the Ashua and Unyama.

From Fatiko to Atada, on the Victoria Nile, the route leads through high grass and forest, and the country is uninhabited.

At Atada, about four miles above the Karuma Falls, the Victoria Nile is 500 yards wide, but with a very slow stream. The banks are from 60 to 80 feet high, covered with most luxuriant vegetation.

From Atada to Masindi, the country is the same as between Fatiko and Atada, the richest soil, covered with high grass and forest; and swampy bottoms in every undulation of the ground.

Both men and women dress decently in Minyoro; a robe of bark-cloth round the waist, reaching to the ankles, and another cloth under the left arm, and tied over the right shoulder, and reaching to the knees, are universally worn by both sexes. The women do all the work in the fields, and use a very light hoe, similar in shape to that of Fatiko, but small enough to be used with one hand.

The soil is a beautiful black loam, is very easily turned up, and is free from stones or clods. It is exceedingly rich. The sweet-potato and banana are extensively cultivated, and form the staple of food in this country; but dourra (*Sorghum vulgare*) and tullaboon (korrakan of Ceylon) are also grown. There is

also a small kind of Indian corn, but in no great quantity. Tobacco is indigenous throughout the whole of the countries traversed by the Expedition, and is prepared in different ways by the natives, each tribe having its peculiar method. It being considered *infra dig.* for a man to work in the fields, the men amuse themselves by dancing, singing, drinking, and beating drums all night, and go to sleep for the greater part of the day, while the women do all the work.

From our camp at Masindi we could see the mist rising from the Albert N'yanza in the mornings, and with a powerful telescope could distinguish trees on the mountains on the opposite side of the lake. We could also see a waterfall on the opposite side with the telescope.

Whilst at Masindi, a native of Karagwe told us that it was quite possible to go from Chibero, on the Albert N'yanza, past Uvira to Ujiji by boat. He said that at Uvira the lake was very narrow, and that it could not be passed without a pilot who knew the way. He described the lake as varying very much in width, being immensely wide beyond Vacovia, and again contracting at Uvira. This report was confirmed by a Kisuhili man, who had been living with Mtésa for many years, and who was sent by him to see Sir Samuel Baker at Fatiko. He knew both Uvira and Ujiji, which he called Uyiwi.

Mtésa sent messengers to Ujiji, at Sir Samuel Baker's request, to obtain news of Livingstone, and on their return they said that a white traveller had crossed the Tanganyika (which they called Mwotanzigé, the native name of the Albert N'yanza) from Ujiji, and had not since been heard of, but that if he returned we should be informed of it. Sir Samuel Baker wrote to Mtésa, and gave him letters to deliver to Livingstone, should he find him. Mtésa has turned Moslem, and given up all his savage customs, mentioned by Speke, of slaughtering his women, &c., and he now keeps scribes, and is learning to read and write Arabic. He wrote a most polite answer to Sir Samuel Baker's letter, declaring that he would take the greatest care of Livingstone if he should find him.

In Uganda, coffee and the sugar-cane are cultivated by the natives, who dress in the same manner as the people of Minyoró, but speak a different language.

On our return to Fatiko, we fortified the camp with a ditch and breastwork. This took us several months to complete, as the subsoil was the hardest gravel; and we had only the natives' worn-out hoes to work with. No trace of any metal, except iron, could be found throughout the country, though Sir Samuel Baker was always examining the rocks, which all are igneous.

Having established the greatest confidence in the country

round about Fatiko, we left for Ismailia, where we arrived on the 1st April, 1873, and found that the English mechanics had constructed one of Messrs. Samuda's steel steamers.

We started for Khartoum on the 26th May, and found the Bahr Zaraffe very much improved since the time when we had last passed it, so that we got through without much difficulty. Below the "dubbah," however, the river was very much narrower than before, the grass having grown in from the banks towards the middle, and I believe that in a few years the "sud" will extend about 80 miles north of the "dubbah," where it is now clear.

In the present state of the Bahr Zaraffe, it is quite impossible to say how long vessels may be on the voyage from Khartoum to Ismailia. The troops that were sent up as a reinforcement from Khartoum were 14 months on the road, as they were obliged to pass the season of the low Nile at a station about 120 miles north of the "dubbah." Communication being thus next to impossible, the Bahr Zaraffe cannot be considered a navigable river, and unless the whole stoppage on the Nile itself is cleared, the beautiful countries to the south of Ismailia will never be opened to civilisation.

Ismail Pacha, the Governor of Khartoum, went up in 1872, at the proper season, with a large force, and cleared away a great part of the original Nile stoppage, and he intended to go up again in October, 1873, to try and finish it. Should he succeed, and open the river to navigation between Khartoum and Ismailia, one of the greatest difficulties that we had to contend with, namely, want of communication with Egypt, will have disappeared. It will then be easy for steamers to run every month or so with the mails, or whatever is required at Ismailia, returning each time laden with ivory, and there may be a great future for the country.

In conclusion, I beg leave to express my high opinion of the merits of Captain George's Artificial Horizon, one of which I used throughout the expedition, and which I consider to be a most perfect instrument. During the whole of the expedition I never had occasion to replenish the mercury, whereas with the common form of horizon, the mercury is constantly being wasted. The floating glass answers the purpose admirably of preventing any tremor, and the advantage of being able to fill or empty the receiver without any risk of losing mercury is very great.

METEOROLOGICAL REGISTER kept by LADY BAKER.

Place.	Date.	Thermometer.		Rainfall.	Wind.	REMARKS.
		6 A.M.	Noon.			
Ismailia ..	1871.					
	Aug. 1	70	80	..	variable	Light.
	" 2	73	82	..	"	
	" 3	72	80	·29	"	
	" 4	72	82	..	"	
	" 5	74	82	..	"	
	" 6	73	84	..	"	
	" 7	74	80	·01	"	
	" 8	74	80	..	"	
	" 9	74	78	..	"	
	" 10	72	76	·22	S.W.	Light.
	" 11	72	82	..	W.	
	" 12	74	85	..	N.E.	
	" 13	74	74	·22	N.	
	" 14	70	84	..	N.	
	" 15	75	83	..	S.W.	
	" 16	74	80	·21	N.E.	
	" 17	77	74	·56	N.E.	
	" 18	72	80	..	E.	Light.
	" 19	74	75	·07	variable	
	" 20	72	82	..	N.E.	
	" 21	72	82	..	variable	
	" 22	73	84	..	N.	
	" 23	70	84	..	S.W.	
	" 24	73	85	..	N.	
	" 25	75	85	..	N.	Light.
	" 26	75	90	..	variable	
	" 27	74	85			
	" 28	73	85			
	" 29	77	86			
	" 30	76	86			
	" 31	75	85	·12		
Belinian ..	Sept. 1	72	87	..	N.E.	
	" 2	69	72	1·78	S.W.	
	" 3	70	83			
	" 4	72	85	..	N.	
	" 5	72	86			
	" 6	71	80	1·10	S.	
	" 7	70	86	..	N.	Light.
	" 8	75	84			
	" 9	74	74	1·02	S.E.	
	" 10	72	84			
	" 11	72	87	..	N.	
	" 12	73	86			
Belinian ..	" 13	72	84			
	" 14	72	84			
	" 15	73	78	..	N.W.	
	" 16	70	75			
	" 17	70	80			
	" 18	70	78	3·20		
	" 19	68	77	..	variable	

METEOROLOGICAL REGISTER kept by **LADY BAKER**—*continued.*

Place.	Date.	Thermometer.		Rainfall.	Wind.	REMARKS.
		6 A.M.	Noon.			
Belinian ..	1871.					
	Sept. 20	72	82			
	" 21	74	81		W.	
	" 22	72	80	..		
	" 23	72	82	..	N.	
	" 24	72	83	..	W.	
	" 25	70	85			
	" 26	76	85			
	" 27	70	78			
	" 28	72	82	..	N.	
	" 29	72	82	..	N.W.	
	" 30	73	82	..	N.	
	Oct. 1	73	84	..	N.	
	" 2	71	85	..	S.	
	" 3	72	84			
	" 4	72	85			
	" 5	73	84			
Ismailia ..	" 6	74	90			
	" 7	75	90			
	" 8	75	86		S.W.	
	" 9	74	80	·20		
	" 10	70	90	..	variable	
	" 11	75	86	..	W.	
	" 12	74	88			
	" 13	75	86	·19	S.W.	
	" 14	72	82	1·04		
	" 15	70	84	·08	S.	
	" 16	70	85	..	variable	
	" 17	70	89	..	N.	
	" 18	70	87	..	N.W.	
	" 19	73	86	..	N.	Light.
	" 20	74	88	..	N.	
	" 21	74	87	..	S.E.	
	" 22	75	84	..	S.	
	" 23	75	82	..	S.	
	" 24	72	82	..	S.	
	" 25	71	84	..	S.	
Nov.	" 26	72	82	..	variable	
	" 27	72	84	..	S.	
	" 28	72	82	..	W.	
	" 29	70	86	..	variable	
	" 30	74	86	..	N.	
	" 31	74	86	..	N.	
	" 1	72	86	..	S.	Lig
	" 2	74	87	..	N.	
	" 3	74	82	..	S.	
	" 4	72	85	..	variable	
	" 5	72	86	..	S.	
	" 6	76	86	..	S.	
	" 7	74	87	..	variable	
	" 8	73	86	..	S.	
	" 9	73	86	..	variable	

METEOROLOGICAL REGISTER kept by LADY BAKER—*continued.*

Place.	Date.	Thermometer.		Rainfall.	Wind.	REMARKS.
		6 A.M.	Noon.			
Ismailia ..	1871.					
	Nov. 10	74	88	..	S.	
	" 11	74	88	..	N.E.	
	" 12	72	84	..	S.	
	" 13	76	86	..	N.	
	" 14	74	85	..	variable	
	" 15	75	86			
	" 16	70	86			
	" 17	73	86	..	S.	
	" 18	73	85	..	N.	
	" 19	73	86	..	N.E.	
	" 20	73	90	..	S.	
	" 21	72	92	..	S.	
	" 22	70	88	..	N.	
	" 23	70	90	..	variable	
	" 24	70	90	..	S.	
	" 25	70	90	..	S.	
	" 26	72	90	..	S.	
	" 27	72	89	..	W.	
	" 28	73	89			
	" 29	71	89	..	S.	
	" 30	70	90	..	E.	
	Dec. 1	72	90	..	N.	
	" 2	76	88	40	N.	
	" 3	76	77	..	S.W.	
	" 4	75	83	20	S.W.	
	" 5	72	84	..	W.	
	" 6	72	87	..	variable	
	" 7	70	90	12	N.E.	
	" 8	74	92	..	N.	
	" 9	76	93	..	N.	
	" 10	72	90	..	variable	
	" 11	76	92	..	S.	
	" 12	74	94	..	S.	
	" 13	74	87	..	S.	
	" 14	70	90	26	S.	
	" 15	72	88	..	S.E.	
	" 16	70	87	..	S.	
	" 17	70	90	..	S.W.	
	" 18	75	90	..	variable	
	" 19	72	93	..	..
	" 20	70	90	..	S.	
	" 21	70	90	..	variable	
	" 22	74	90	..	W.	
	" 23	72	88	..	variable	
	" 24	72	88	..	S.	
	" 25	68	87	..	N.	
	" 26	70	90	..	N.	
	" 27	70	88	..	N.	
	" 28	69	86	..	variable	
	" 29	66	90	..	W.	
	" 30	66	88	..	variable	
	" 31	66	88	..	..

METEOROLOGICAL REGISTER kept by LADY BAKER—continued.

Place.	Date.	Thermometer.		Rainfall.	Wind.	REMARKS.		
		6 A.M.	Noon.					
	1872.							
Ismailia ..	Jan.	1	69	90	..	variable		
	"	2	70	90	..	"		
	"	3	69	90	..	"		
	"	4	70	92	..	"		
	"	5	70	90	..	"		
	"	6	70	88	..	"		
	"	7	70	88	..	N.		
	"	8	63	80	..	N.		
	"	9	63	82	..	N.		
	"	10	65	84	..	N.		
	"	11	68	92	..	N.		
	"	12	70	90	..	W.		
	"	13	70	90	..	variable		
	"	14	70	88	..	"		
	"	15	70	88	..	"	Light.	
	"	16	70	88	..	W.		
	"	17	69	88	..	S.		
	"	18	69	90	..	N.		
	"	19	66	90	..	variable		
	"	20	72	92	..	N.	Strong.	
	"	21	72	92	..	S.		
	"	22	80	86	..	S.		
	"	23	74	90	..	variable		
	"	24	80	92	..	"		
	"	25	75	89	..	"		
	"	26	77	92	..	S.		
	Lat. 4° 36' N.	"	27	77	88	..	variable	Light.
		"	28	77	88	..	N.	
		"	29	70	92	..	N.W.	
		"	30	77	88	..	N.	Light.
		"	31	75	90	..	variable	
Feb.		1	75	90	..	N.		
"		2	72	84	..	N.		
"	3	72	86	..	S.	Light.		
"	4	74	84	..	variable			
"	5	70	90	..	S.			
"	6	70	92	..	E.			
"	7	70	80	..	S.	Strong.		
"	8	71	84	..	variable	Strong.		
"	9	64	84	..	N.			
Lat. 4° 28' N.	"	10	64	84	..	N.		
Lat. 4° 18' N.	"	11	66	88	..	variable		
Lat. 4° 7' N.	"	12	66	90	..	N.	Light.	
{ Lat. 4° 1' N. Lobosé.	"	13	70	90	..	N.N.W.		
	"	14	68	88	..	N.W.		
	"	15	70	86	..	N.W.		
	"	16	74	87	..	N.N.W.		
	"	17	71	81	..	variable		
	"	18	71	87	..	W.		
	"	19	69	90	..	variable		
	"	20	72	88	..	N.	Strong.	

METEOROLOGICAL REGISTER kept by LADY BAKER—continued.

Place.	Date.	Thermometer.		Rainfall.	Wind.	REMARKS.
		6 A.M.	Noon.			
	1872.					
{ Lat. 4° 1' N. Loboré.	Feb. 21	71	83	..	S.S.E.	Strong.
	" 22	68	88	..	S.E.	
	" 23	71	85	..	N.	
	" 24	77	80	..	N.	
	" 25	69	80	..	variable	
	" 26	69	86	..	N.	
	" 27	71	86	..	S.	Strong.
	" 28	70	82	..		
	" 29	71	80	..	N.	Strong.
	March 1	66	80	..	N.	
" 2	70	89	..	variable		
" 3	69	89	..	..	Strong.	
" 4	69	88	..	E.		
" 5	68	88	..	S.E.		
" 6	69	90	..	S.E.		
{ Lat. 3° 7' N. Shooa. { Lat. 3° 1' N. Fatiko.	" 7	69	89	..	variable	
	" 8	69	88	..	N.	
	" 9	68	85	..	N.	
	" 10	68	85	..	E.	
	" 11	68	85	..	E.	
	" 12	70	84	..	variable	
	" 13	70	85	..	E.	Strong.
	" 14	70	74	..	S.E.	
	" 15	65	77	..	S.E.	
	" 16	68	81	..	E.	Strong.
" 17	70	85	..	S.E.	Strong.	
" 18	70	86	..	variable		
" 19	70	86	..	E.		
" 20	68	80	..	E.		
" 21	66	80	..	variable		
" 22	68	82	..	E.		
{ Lat. 2° 16' N. Atada.	" 23	65	80	..	N.E.	
	" 24	65	80	..	E.	
	" 25	66	78	..	variable	
	" 26	64	80	..	N.	
	" 27	68	82	..	N.	
	" 28	68	82	..	E.	
	" 29	64	84	..	N.E.	
	" 30	64	76	..	S.E.	
	" 31	64	76	..	N.E.	
	April 1	64	80	..	S.	Light.
" 2	66	78	23	S.E.		
" 3	64	80	..	S.E.		
" 4	65	79	1.50	E.		
" 5	64	78	..	S.E.		
" 6	65	80	07	E.		
" 7	64	79	..	E.		
" 8	65	80	16	E.		
" 9	66	78	..	N.E.		
" 10	64	73	73	variable		

METEOROLOGICAL REGISTER kept by LADY BAKER—continued.

Place.	Date.	Thermometer.		Wind.	RAIN.—REMARKS.
		6 A.M.	Noon.		
	1872.				
Masindi ..	June 1	64	74	S.	
	2	64	69	S.W.	
	3	64	74	S.	
	4	65	76	S.	
	5	62	70	W.	Strong.
	6	64	70	W.	
	7	64	70	N.E.	
	8				
	9				
Fatiko ..	10				
	Aug. 11	65	75	N.	Rained hard.
	12	65	75	N.	
	13	65	86	N.	Light.
	14	64	75	N.	Rained heavily at night.
	15	64	83	N.	Rained in the night.
	16	63	83	N.	
	17	63	83	N.	
	18	65	78	S.	Rained in the night.
	19	63	78	N.	Rained in the night.
	20	65	83	N.	
	21	65	84		
	22	65	79	S.	Heavy rain at night.
	23	66	84	S.	Light rain.
	24	64	80	N.	Rained at night.
	25	65	80	N.	Heavy rain.
	26	66	80	N.	Rained in the night.
	27	66	80	N.	Heavy rain.
	28	66	80	N.	Rained in the night.
	29	64	80	N.	Showery.
	30	65	83	N.	Rained all night.
	31	65	83	N.	
	Sept. 1	63	78	N.	{ Light rain from 1 P.M. till 5 P.M., and at night.
	2	66	79	N.	Rained all the afternoon.
	3	66	80	N.	
	4	63	80	N.	Heavy rain at night.
	5	66	80	S.	Light rain during the day.
	6	66	79	W.	Showery.
	7	66	79	N.	A shower in the night.
	8	66	79	N.	A shower in the night.
	9	66	86	variable	
	10	62	86		
	11	63	79	N.	Heavy rain early.
	12	66	86	S.	
	13	66	86	S.	
	14	66	86	N.	
	15	66	86	variable	A shower.
	16	66	86	E.	Rained during the night.
	17	63	84	E.	Heavy rain at night.
	18	66	86	N.W.	Slight rain at night.
	19	66	86	variable	
	20	63	80	N.	A shower.
	21	66	86	N.W.	

METEOROLOGICAL REGISTER kept by LADY BAKER—*continued.*

Place.	Date.	Thermometer.		Wind.	RAIN.—REMARKS.
		6 A.M.	Noon.		
	1872.				
Fatiko ..	Sept. 22	66	88	variable	
	" 23	66	74	N.	Light rain during the night.
	" 24	66	80	N.	
	" 25	66	80	variable	
	" 26	65	80	S.E.	Slight rain at night.
	" 27	66	84	N.W.	
	" 28	66	86	N.W.	
	" 29	65	85	S.E.	Heavy rain at night.
	" 30	63	84	S.E.	Heavy rain at night.
	Oct. 1	65	84	variable	Rained during the night.
	" 2	66	84	N.W.	
	" 3	66	86	S.E.	
	" 4	66	86	E.	
	" 5	72	86	E.	
	" 6	70	88	E.	
	" 7	72	90	S.E.	
	" 8	72	90	E.	
	" 9	72	80	N.	
	" 10	63	81	N.	Light rain at night.
	" 11	63	84	variable	Light rain at night.
	" 12	66	84	"	{ Heavy shower in afternoon, and light at night.
	" 13	66	84	"	Rained during the night.
	" 14	66	86	"	
	" 15	66	84	"	A shower at night.
	" 16	65	86	E.	Light rain at night.
	" 17	66	77	N.	Light rain at night.
	" 18	66	86	N.	A shower at night.
	" 19	66	79	variable	Rained during the night.
	" 20	64	79	N.	{ From 3-30 P.M. till 6 P.M., and during the night.
	" 21	65	81	N.	
	" 22	66	81	N. light	
	" 23	66	86	E. strong	
	" 24	72	90	variable	
	" 25	72	90	N.	
	" 26	72	86	N.	
	" 27	64	77	variable	Rained during the night.
	" 28	62	79	"	Heavy rain during the night.
	" 29	63	80	"	{ Rained for 2 hours heavily in the evening.
	" 30	61	79	"	{ Rained for 1½ hour in the evening.
	" 31	65	82	S.E.	
	Nov. 1	66	86	S.E.	
	" 2	65	84	E.	
	" 3	66	84	E.	
	" 4	66	90	N.	
	" 5	72	90	E. by S.	
	" 6	64	88	{ S.E. strong.	
	" 7	65	90	S.E.	
	" 8	66	88	E. strong	

METEOROLOGICAL REGISTER kept by LADY BAKER—continued.

Place.	Date.	Thermometer.		Wind.	RAIN.—REMARKS.
		6 A.M.	Noon.		
Fatiko ..	1872.				
	Nov. 9	72	90	E.	
	" 10	72	90	variable light	
	" 11	66	88	E. strong	
	" 12	61	86	"	
	" 13	61	86	"	
	" 14	61	88	"	
	" 15	66	90	"	
	" 16	65	86	N. light	{ Heavy rain in afternoon and shower at night.
	" 17	63	72	N.E.	{ Light rain for 2 hours in the night.
	" 18	60	75	variable	
	" 19	63	84	S.E.	
	" 20	66	84	E.	
	" 21	61	84	E. strong	
	" 22	63	86	"	
	" 23	66	90	E. light	
	" 24	65	90	"	
	" 25	66	80	variable	{ Light rain for 3 hours in the night.
	" 26	61	84	S.E.	{ Heavy rain for an hour in the evening.
	" 27	65	82	S.	Steady light rain all night.
	" 28	65	79	S.E.	Rained during the night.
	" 29	65	84	S.E.	Heavy rain in the evening.
	" 30	66	84	S.	
	Dec. 1	66	86	variable	Rained during the night.
	" 2	66	88	E.	
	" 3	66	88	E.	
	" 4	72	86	variable	
	" 5	66	80	S.E.	
	" 6	66	86	variable	Heavy rain for 2½ hours.
	" 7	66	86	"	
	" 8	66	84	"	Light at night.
	" 9	66	80	E.	{ Rained for 2 hours in afternoon, and at night.
	" 10	66	84	variable	A light shower.
	" 11	66	84	"	
	" 12	72	88	S.E.	
	" 13	72	88	S.E. strong	
	" 14	62	86	S.E. strong	
	" 15	63	88	S.E.	
	" 16	66	86	S.E.	
	" 17	63	88	S.E.	
	" 18	60	86	S.E.	
	" 19	61	86	S.E.	
	" 20	61	86	S.E.	
	" 21	66	88	S.E.	
	" 22	63	89	S.E.	
	" 23	66	88	variable	

METEOROLOGICAL REGISTER kept by LADY BAKER—continued.

Place.	Date.	Thermometer.		Wind.	RAIN.—REMARKS.
		6 A.M.	Noon.		
Fatiko ..	1872. Dec. 24	66	88	S.E.	Light shower in the evening, and heavy rain from 3.30 P.M. till 6 P.M. Light shower in the morning. Light in the afternoon.
	,, 25	72	88	S.E.	
	,, 26	66	79	N.	
	,, 27	66	81	N.	
	,, 28	66	79	N.	
	,, 29	63	79	variable	
	,, 30	66	79	,,	
	,, 31	66	79	,,	
	1873. Jan. 1	66	79	N. strong	
	,, 2	61	80	variable	
	,, 3	63	84	,,	
	,, 4	66	86	E.	
	,, 5	66	86	E.	
	,, 6	66	88	E.	
	,, 7	66	88	N.	
	,, 8	66	88	variable	
	,, 9	66	86	N.	
	,, 10	63	79	N.	
	,, 11	61	79	N.W.	
	,, 12	63	80	N.W.	
	,, 13	66	88	N.E.	
	,, 14	66	79	N.E.	
	,, 15	63	66	N.W.	
	,, 16	63	77	N.W.	
	,, 17	66	81	variable	
	,, 18	66	86	E.	
	,, 19	66	86	E.	
	,, 20	64	86	E. strong	
	,, 21	64	86	,,	
	,, 22	63	88	,,	
	,, 23	68	88	variable	
	,, 24	70	90	E.	
	,, 25	65	88	E.	
	,, 26	63	88	S.E.	
	,, 27	63	90	N.W.	
	,, 28	68	68	N.E.	
	,, 29	66	88	S.E.	
	,, 30	66	88	strong.	
	,, 31	68	88	E. strong	
	Feb. 1	66	88	variable	
	,, 2	66	88	E. light	
	,, 3	68	84	variable	Rained, twenty minutes in afternoon. Light rain at night.
	,, 4	64	86	,,	
	,, 5	72	86	E.	
	,, 6	72	90	variable	
	,, 7	72	90	E.	

METEOROLOGICAL REGISTER kept by LAKY BAKER—continued.

Place.	Date.	Thermometer.		Wind.	RAIN.—REMARKS.
		6 A.M.	Noon.		
Fatiko ..	1873.				
	Feb. 8	72	88	E.	
	" 9	68	88	E.	
	" 10	66	90	E.	
	" 11	66	90	E.	
	" 12	66	90	E.	
	" 13	66	86	E. strong	
	" 14	72	88	variable	
	" 15	72	92	"	
	" 16	68	92	E.	
	" 17	68	90	E.	
	" 18	72	90	E.	
	" 19	68	88	N. strong	
	" 20	72	86	"	
	" 21	63	84	"	
	" 22	66	86	N.N.W.	
	" 23	68	88	N.W.	
	" 24	72	88	N.W.	
	" 25	77	86	variable	
	" 26	75	90	"	
	" 27	72	90	S.E.	
	" 28	68	86	S.E.	
	March 1	68	86	variable	Slight shower in afternoon.
	" 2	68	88	"	A shower.
	" 3	66	88	"	A heavy shower.
	" 4	66	86	E.	A shower.
	" 5	65	88	variable	
	" 6	66	86	"	Light shower at 4:30 P.M.
	" 7	66	90	S.E.	Two showers.
	" 8	68	90	N.W.	
	" 9	75	90	variable	
	" 10	72	88	N.W.	
	" 11	66	88	N.W.	
	" 12	72	88	N.	
	" 13	68	86	variable	
	" 14	66	88	S.	A shower.
	" 15	68	84	S.E.	
	" 16	68	84	N.W.	Light shower.
	" 17	66	72	variable	Heavy rain at night.
	" 18	72	81	N.W.	
	" 19	68	84	N.W.	
	" 20	66			
On the march	" 21				
	" 22				
	" 23	66	93	S.W.	
	" 24				
	" 25				
	" 26	72	95	variable	
	" 27	81	84	"	
	" 28	72	93	E.	A heavy shower.
	" 29	72	95	variable	A heavy shower.
	" 30	72	93	"	
	" 31	75	92	"	
Ismailla ..	April 1	75	95	"	

METEOROLOGICAL REGISTER kept by LADY BAKER—continued.

Place.	Date.	Thermometer.		Wind.	RAIN.—REMARKS.
		G A.M.	Noon.		
Ismailia ..	1873.				
	April 2	72	93	variable	
	" 3	75	93	E. strong	Slight rain.
	" 4	72	95	"	Slight rain.
	" 5	75	86	S.W.	
	" 6	75	91	S.W.	
	" 7	79	93	S.	
	" 8	75	88	variable	Light rain.
	" 9	75	88	S.W.	
	" 10	77	97	N.W.	
	" 11	75	97	E.	
	" 12	77	95	S.	
	" 13	79	91	W.	
	" 14	75	91	S.	
	" 15	77	93	S.W.	
	" 16	77	77	variable	
	" 17	72	91	"	
	" 18	75	77	S.W.	Light shower.
	" 19	72	93	N.	Steady rain.
	" 20	75	86	S.	
	" 21	75	91	S.	Rain at night.
	" 22	75	95	variable	Light steady rain.
	" 23	75	88	S.	A heavy shower.
	" 24	72	79	variable	Steady rain all night.
	" 25	75	88	"	
	" 26	75	88	S.	Heavy rain at night.
	" 27	77	79	S.	Light rain.
	" 28	73	84	variable	
	" 29	75	88	S.	
	" 30	75	79	variable	Light rain at night.
	May 1	72	88	"	
	" 2	75	91	N. light	
	" 3	75	88	S. strong	
	" 4	75	80	variable	{ Light rain for three hours in morning.
	" 5	75	91	"	Light shower.
	" 6	77	91	S.	Shower at night.
	" 7	72	81	S.	{ Heavy rain from 3 A.M. till 9 A.M.
	" 8	75	91	S.	
	" 9	79	93	S.	
	" 10	75	88	S.	Heavy shower at night.
	" 11	75	90	variable	
	" 12	77	90	S.	A shower at night.
	" 13	75	73	N.E.	{ Heavy rain from 9 A.M. till 4.30 P.M.
	" 14	74	88	S.	
	" 15	74	88	S. light	
	" 16	75	95	"	
	" 17	75	88	"	
	" 18	74	75	N.E.	Slight rain.
	" 19	73	84	S. light	
	" 20	73	91	variable	Slight shower.
	" 21	73.	84	S.	

METEOROLOGICAL REGISTER kept by LADY BAKER—continued.

Place.	Date.	Thermometer.		Wind.	RAIN.—REMARKS.
		6 A.M.	Noon.		
	1873.				
Ismailia ..	May 22	74	84	S.	
	" 23	75	88	S.	
	" 24	73	88	S.	Heavy rain all night.
	" 25	75	88	S.	Heavy rain all night.
White Nile, on passage to Khar- toun.	" 26	70	88	S.	
	" 27	70	79	S.	Heavy rain in the night.
	" 28	75	86	variable	
	" 29	79	88	"	A shower.
	" 30	77	86	"	
	" 31	75	84	S.	
White Nile	June 1	75	84	S. light	
	" 2	75	84	S.	
	" 3	75	86	S.	
	" 4	75	80	N.W.	Light rain all day.
Bahr Zaraffe	" 5	75	84	"	
	" 6	75	84	S.	
	" 7	75	84	variable	Heavy rain in afternoon.
	" 8	75	84	S.	
	" 9	75	86	variable	Very heavy rain.
	" 10	75	86	S.	
	" 11	75	86	S.	
	" 12	75	86	S.	
	" 13	79	86	S.	
	" 14	79	86	S.	
	" 15	79	86	S.	
	" 16	77	86	N.	
	" 17	77	86	variable	
	" 18	77	88	S.	
White Nile	" 19	75	86	S.	
	" 20	75	86	N.	Heavy rain at night.
	" 21	79	87	S.	
	" 22	77	86	S.	Heavy rain at night.
	" 23	79	86	S.	
	" 24	79	88	S.	
	" 25	75	86	N. strong	Light rain.
	" 26	79	88	S.	
	" 27	79	88	variable	Light rain.
	" 28	75	86	N.	
Kharloun..	" 29	79	90	S.	
	" 30	79	90	S.	
	July 1	79	90	S.	
	" 2	79	92	S.	
	" 3	82	91	S.	
	" 4	84	92	S.	
	" 5	79	91	variable	
	" 6	84	93	W.	
	" 7	79	85	S.	

MEAN TEMPERATURES AND RESULTS FROM LADY BAKER'S MEMORANDA; arranged by LIEUT. J. A. BAKER, R.N.

Place.	Year and Month.	Thermometer at 6 A.M.			Thermometer at Noon.			Rainfall.	Number of Days on which Rain fell.	Prevailing Wind.	Number of Days on which this Wind blew.	REMARKS.
		Min.	Mean	Max.	Min.	Mean	Max.					
Ismaïlia	1871. Aug.	70	73	77	74	82	90	1.7	8	variable	11	Also N.W. 5 days; and W. 6 days. And N. 6 days. And N. 7 days. And variable 15 days; and S. 4 days. And S. 4 days. And S.E. 6 days; and N. 5 days. And S.E. 9 days; and S. 5 days. { And S.W. 7 days; and S.E. 4 days; and W. 4 days. Only the first 7 days in June were noted. Only from August 11th. And 4 days N.W. And E. 6 days; and S.E. 3 days. And S.E. 6 days. { And N. 4 days; N.W. 4 days; N.E. 3 days.
	Sept.	68	71	76	72	..	87	7.1	4	N.	12	
	Oct.	70	75	82	75	..	90	1.51	4	S.	14	
	Nov.	70	..	76	82	..	90	Nil	..	S.	7	
Ismaïlia and Fatiko Fatiko and Atada Atada and Masindi	Dec.	66	..	76	77	..	94	.98	4	S.	7	And variable 15 days; and S. 4 days. And S. 4 days. And S.E. 6 days; and N. 5 days. And S.E. 9 days; and S. 5 days. { And S.W. 7 days; and S.E. 4 days; and W. 4 days. Only the first 7 days in June were noted. Only from August 11th. And 4 days N.W. And E. 6 days; and S.E. 3 days. And S.E. 6 days. { And N. 4 days; N.W. 4 days; N.E. 3 days.
	1872. Jan.	63	..	80	80	..	92	Nil	..	N.	9	
	Feb.	64	..	75	80	..	90	Nil	..	N.	10	
	March	64	..	70	74	..	90	Nil	..	E.	10	
Masindi	April	64	..	68	72	..	80	6.19	14	E.	12	And variable 15 days; and S. 4 days. And S. 4 days. And S.E. 6 days; and N. 5 days. And S.E. 9 days; and S. 5 days. { And S.W. 7 days; and S.E. 4 days; and W. 4 days. Only the first 7 days in June were noted. Only from August 11th. And 4 days N.W. And E. 6 days; and S.E. 3 days. And S.E. 6 days. { And N. 4 days; N.W. 4 days; N.E. 3 days.
	May	59	..	65	69	..	75	6.04	14	S.	10	
	June	62	..	65	70	..	76	..	..	S.	..
	July	63	..	66	75	..	86	..	14	N.	17	
Fatiko	Aug.	62	..	66	74	..	88	..	17	N.	11	And variable 15 days; and S. 4 days. And S. 4 days. And S.E. 6 days; and N. 5 days. And S.E. 9 days; and S. 5 days. { And S.W. 7 days; and S.E. 4 days; and W. 4 days. Only the first 7 days in June were noted. Only from August 11th. And 4 days N.W. And E. 6 days; and S.E. 3 days. And S.E. 6 days. { And N. 4 days; N.W. 4 days; N.E. 3 days.
	Sept.	61	..	72	77	..	90	..	15	N.	9	
	Oct.	60	..	72	72	..	89	..	7	E.	14	
	Nov.	60	..	72	79	..	89	..	8	S.E.	14	
Ismaïlia	Dec.	61	..	70	66	..	90	E.	12	And variable 15 days; and S. 4 days. And S. 4 days. And S.E. 6 days; and N. 5 days. And S.E. 9 days; and S. 5 days. { And S.W. 7 days; and S.E. 4 days; and W. 4 days. Only the first 7 days in June were noted. Only from August 11th. And 4 days N.W. And E. 6 days; and S.E. 3 days. And S.E. 6 days. { And N. 4 days; N.W. 4 days; N.E. 3 days.
	1873. Jan.	61	..	70	66	..	90	..	..	E.	12
	Feb.	63	..	77	84	..	92	..	2	E.	12	
	March	65	..	75	72	..	95	..	11	variable	9	
White Nile and Khartoum.	April	72	..	79	79	..	97	..	12	S.	20	And S.W. 5 days. And N. 4 days. Only for the first 7 days in July.
	May	70	..	79	73	..	93	..	13	S.	20	
	June	75	..	79	80	..	90	..	7	S.	20	
	July	79	..	84	85	..	93	..	..	S.	..

METEOROLOGICAL REGISTER.—TOWFIKIA, Lat. 9° 25' 15". 1870.

Month.	Mean Temperature, Fahr.		Rainfall.	
	6 A.M.	Noon.	Days heavy.	Days light.
May	73·3	92·2	3	4
June	72·3	86·5	5	6

METEOROLOGICAL REGISTER kept at TOWFIKIA, on the WHITE NILE, Latitude 9° 25' 15" N., in 1870, by LIEUT. JULIAN A. BAKER, R.N., during SIR S. W. BAKER'S KHEDIVE EXPEDITION.

Date.	Aneroid.	Thermo- meter.	Wind.	Force.	Weather.	REMARKS.
	Inches.					
July 23 - A.M.	28·56	73°	S.	2	c	
- P.M.	·55	80	S.W.	7	tqr	
„ 24 - A.M.	·60	73	S ^w	2	co	
- P.M.	..	..	S ^w	3	or	
„ 25 6 A.M.	·65	71	S ^w	2	c	
6 P.M.	·58	80	S ^w	2	bc	
„ 26 6 A.M.	·62	73	calm	0	bc	
6 P.M.	·55	78	S.	1	bc	
„ 27 - A.M.	·65	73	S.	1	bc	
6 P.M.	·51	79	calm	0	bc	Rained heavily in night.
„ 28 6 A.M.	·62	72	S.W ^{ly}	2	bct	
„ 29 6 A.M.	·60	75	S.W.	2	bc	
- P.M.	..	..	N ^w	3	cr	{ Hard rain for two hours in the afternoon.
„ 30 6 A.M.	·56	73	S.	2	bc	
6 P.M.	·50	73	S.	2	cr	Rained from 12½ to 2½ P.M.
„ 31 6 A.M.	·57	78	calm	0	c	
noon	·54	78	S.	2	bc	
6 P.M.	·47	78	calm	0	bc	Means of 9 days' observa- tions: aneroid 28·57, thermometer 75° 1'.
Aug. 1 6 A.M.	·56	73	..	0	bc	
noon	·56	79	S.W.	1	bc	
6 P.M.	·55	74	S.W.	2	cor	Drizzle from 2 to 5 P.M.
„ 2 6 A.M.	·60	73	calm	0	c	
noon	·60	77	S.E.	2	bc	Drizzle from 7 to 9½ A.M.
6 P.M.	·52	78	S.W.	4	bc	
„ 3 6 A.M.	·56	73	calm	0	oc	Rain from 8 to 9 A.M.
6 P.M.	·53	78	S.W.	1	bc	
„ 4 6 A.M.	·58	75	calm	0	bc	
6 P.M.	·48	79	S.	2	bc	
„ 5 6 A.M.	·52	75	calm	0	bc	
6 P.M.	·42	83	..	0	bc	
„ 6 6 A.M.	·54	74	..	0	bc	
noon	·50	88	..	0	bc	Rain from 1 to 2 A.M., req. lt.
6 P.M.	·50	75	N.W.	1	co	Drizzle from 2 to 5 P.M.

METEOROLOGICAL REGISTER kept at TOWFIKIA, on the WHITE NILE—*continued.*

Date.	Aneroid.	Thermo- meter.	Wind.	Force.	Weather.	REMARKS.
Aug. 7	6 A.M. 28·56	73°	N.	1	bc	
	noon ..	..	N.W.	3	bc	Slight rain 7 to 8 P.M.
„ 8	6 A.M. ·55	72	calm	0	bc	
	— P.M. ..	..	N.W.	2	bc	
„ 9	6 A.M. ·54	76	calm	0	bc	
	6 P.M. ·48	79	S.E.	3	cr	Rain from 5½ to 6 P.M.
„ 10	6 A.M. ·56	73	N.W.	3	c	
	noon ·56	74	N.W.	5	cd	Slight drizzle in afternoon.
„ 11	6 A.M. ·56	74	calm	0	bc	Means of 11 days' observations: aneroid 28·54, thermometer 76°.
Sept. 4	6 A.M. ·62	73	„	0	c	
„ 5	„ ·60	75	„	0	bc	Rain from 2½ to 3½ P.M.
„ 6	„ ·57	77	„	0	bc	
	noon ..	..	N.E.	4	cr	Rain from 9 to 12 A.M.
	6 P.M. ..	..	S.E.	3	r	Rain from 5½ to 7 P.M.
„ 7	6 A.M. ·63	74	calm	0	bc	
	noon ..	..	S.E.	3	bc	
	6 P.M. ·52	78	calm	0	bc	
„ 8	6 A.M. ·60	75	„	0	bc	
„ 9	„ ·61	75	„	0	f	Rain from 9 to 9½ A.M.
	noon ..	..	S.	6	bc	
„ 10	6 A.M. ·54	76	S.	1	bc	
	6 P.M. ·58	76	calm	0	bc	
„ 11	6 A.M. ·63	74	„	0	bc	
	6 P.M. ..	..	S.E.	2	bc	Rain from 2 to 2½ P.M.
„ 12	6 A.M. ·65	76	N.E.	1	bc	
	noon ..	..	N.E.	5 to 8	cpq	Hard rain 2 to 3 P.M.
	6 P.M. ..	..	N.E.	1	bc	
„ 13	6 A.M. ·67	74	calm	0	bc	
	noon ..	..	S.	4	bc	
	6 P.M. ..	..	S.	3	bc	
„ 14	6 A.M. ·64	75	N.	1	bc	
„ 15	„ ·62	76	N.	1	bc	Means of 12 days' observations: aneroid 28·61, thermometer 75° 3'.

GENERAL AVERAGE OF ANEROID AND THERMOMETER.

For 9 days in July	..	..	..	28·57	..	75·1
„ 11 „ August	..	..	..	·54	..	76·
„ 12 „ September	..	..	..	·61	..	75·3
32				28·573	..	75·5

OBSERVATIONS for DETERMINATION of HEIGHTS made during Sir S. W. BAKER's KHEDIVE EXPEDITION by
LIEUTENANT JULIAN A. BAKER, R.N.

Date.	Place.	Aneroid.	Air Temperature.	Hypsometers, Nos.			Heights.	
				4693.	9582.	9584.	A.	B.
1870. July, Aug., Sept.	Towfikia	Inches. 28.573	75.5	° ..	° ..	° ..	Feet. 1559	
1871. July 20	Gondokoro .. .. .	..	76.	209.3	209.4	209.4	1481	1391
1872. January 21	.. .. .	..	85.	209.15	209.2	209.2	1622	1542
25	River Level (?)	26.55	..	..	..	..	..	3794
28	Base of Gebel Regiaf	26.52	..	..	..	..	..	3828
28	Top of Gebel Regiaf	26.20	..	..	..	..	..	4186
February 9	Sheik Beden's .. .. .	..	90.	209.	209.1	209.1	1696	1623
10	Koojo .. .. .	..	87.	208.85	208.9	208.9	1806	1725
11	Halt .. .. .	..	90.	208.35	208.5	208.5	2052	1982
14	Gomayshee .. .. .	..	90.	207.85	208.	208.	2346	2277
March 1	Labore .. .. .	..	94.	207.55	207.7	207.7	2542	2471
3	At junction of Asua and Attabbi .. .. .	..	87.	208.7	208.6	208.6	1982	1867
4	Camp .. .. .	..	87.	207.68	207.75	207.75	2481	2411
5	On River Unyama .. .. .	..	90.	207.35	207.4	207.4	2702	2620
11	Shooa .. .. .	..	95.	206.2	206.3	206.3	3886	3316
11	Fatiko .. .. .	..	80.	205.8	205.8	205.8	3587	3542

18	First camp ..	..	..	..	26.92	90.	206.	206.1	206.1	3469	3422
19	Second camp ..	..	..	..	26.80	91.	205.8	205.85	205.85	3622	3563
20	Third camp ..	..	..	..	26.50	79.	205.2	205.2	205.2	3932	3900
21	Fourth camp ..	..	..	..	26.55	82.	205.25	205.3	205.3	3984	3863
5	Foweera ..	..	..	..	26.76	86.	205.8	205.8	205.8	3926	3542
15	Kisoona ..	..	..	..	26.76	71.	205.75	205.8	205.8	3525	3478
16	Kasija ..	..	..	..	26.48	79.	205.25	205.3	205.3	3874	3801
16	Kaki ..	..	..	..	26.51	80.	205.3	205.4	205.4	3821	3757
19	Chorozezi ..	..	..	..	26.70	77.	205.65	205.7	205.7	3625	3557
28	Masindi ..	..	..	..	..	67.	205.2	205.25	205.25	3813	3785
20	Near Shooa Hill ..	..	..	..	..	88.	206.65	206.6	206.6	3167	3081
21	On the River Unyama ..	..	..	..	..	91.	207.6	207.6	207.6	2587	2500
23	Afuddo ..	..	..	..	28.13	84.	208.15	208.2	208.2	2204	2116
27	Labore ..	..	..	..	27.79	92.	207.6.	207.7	207.7	2532	2442
26	Gondokoro ..	..	..	..	..	83.	209.1	209.2	209.2	1616	1510
8	Khartoum ..	..	..	..	28.96	108.	209.6	209.6	209.6	1462	1189
6	Ouaek ..	..	..	..	27.43	95.	206.9	206.9	206.9	3026	2814
2	Cairo* ..	..	..	..	30.30	87.	211.8	211.19	..	87	76

* At a spot known by survey to be above the sea-level 81.3 feet.

The corrections required to be applied to the readings of the hypsometers were found at the Kew Observatory to be as follows:—

Date.	No. 4693.		No. 9582.		No. 9584.	
	At 205°.	At 212°.	At 205°.	At 212°.	At 205°.	At 212°.
1869. May	-0.05	+0.10	.. ..	.. ..	.. ..	.. ..
1868. November ..	..	..	+0.15	+0.20	+0.20	+0.20
1873. December ..	..	..00	..	-0.10	..	-0.10

The following corrections have been used in reducing the heights in column B; they are based upon the latest verifications:—

	No. 4693.	No. 9582.	No. 9584.
At 212	0°00	- 0.10	- 0°10
.. 211	- 0.02	- 0.11	- 0.10
.. 210	- 0.04	- 0.11	- 0.10
.. 209	- 0.06	- 0.12	- 0.10
.. 208	- 0.08	- 0.13	- 0.10
.. 207	- 0.11	- 0.13	- 0.10
.. 206	- 0.13	- 0.14	- 0.10
.. 205	- 0.15	- 0.15	- 0.10

The atmospheric pressure at the sea-level has, in calculating the heights in column B, been assumed the same as that shown on *Buchan's Isobaric Charts*; and the temperature of the air there, the same as that shown on *Dové's Isothermal Charts*.

The heights in column A were calculated on the spot, and are generally greater than those in column B.

Buchan's *Isobaric Charts of the World* furnish the following data for the pressure of the atmosphere at the sea-level, in inches of mercury at the temperature of 32° Fahrenheit, over the countries extending from Egypt to the Equator:—

Months.	Lat. 20° N.	Lat. 10° N.	Lat. 0.
January	30.0	29.9	29.8
February	30.0	29.9	29.8
March	30.0	29.9	29.8
April	29.9	29.8	29.8
May	29.8	29.8	29.8
June	29.7	29.7	29.9
July	29.7	29.7	29.9
August	29.7	29.7	29.8
September	29.8	29.8	29.8
October	29.9	29.9	29.8
November	30.0	29.9	29.8
December	30.0	29.9	29.8

Dove's Isothermal Charts of the World furnish the following data for the mean temperature of the air at the sea-level, for the coast of the same region :—

Months.		Lat. 20° N.	Lat. 10° N.	Lat. 0.
January	.. ..	69	77	79
February	.. ..	77	80	83
March	.. ..	80	85	85
April	.. ..	86	86	83
May	.. ..	86	86	82
June	.. ..	86	86	80
July	.. ..	90	85	79
August	.. ..	86	85	79
September	.. ..	86	82	79
October	.. ..	86	82	79
November	.. ..	77	82	80
December	.. ..	72	77	77

The heights deduced would, of course, be more reliable if we could ascertain the values for atmospheric pressure and temperature at the sea-level for the day and hour on which each observation of the hypsometer or aneroid was made.

The hypsometer observations appear to be excellent. They have been used for checking the aneroid readings. For this purpose the equivalents of tension of vapour for the boiling points have been taken from the extensive table, based upon Regnault's determinations, given in Sir Henry James's *Instructions for taking Meteorological Observations*, and the difference of the corresponding aneroid readings from them taken. From these differences are deduced the following mean corrections for the aneroid :—

At 30 inches	.. ..	— .50
,, 29	.. ..	— .47
,, 28	.. ..	— .45
,, 27	.. ..	— .43

And these corrections have been used in the calculations of the heights of Towfikia and Gebel Regiaf, which are the only ones which depend upon the aneroid.

2nd February, 1874.

R. STRACHAN, F.M.S.

RESULTS of the ASTRONOMICAL OBSERVATIONS made by LIEUT. J. A. BAKER, R.N., during the YEARS 1870, 1871, 1872, and 1873, in SIR S. W. BAKER'S EXPEDITION up the RIVER NILE, calculated by WILLIAM ELLIS, F.R.A.S., of the ROYAL OBSERVATORY, GREENWICH.

TABLE I.—*Results of the Observations for Latitude.*

(These Latitudes are deduced from meridian altitudes, excepting those at Towfikia, 1870, November 7, and November 10 (first result), which are obtained from altitudes taken a little distance from the meridian).

Date.	Name of Place.	Object observed.	Resulting Latitude North.
1870. Jan. 13	Khartoum	Sun	15 36 4
Feb. 14	Fashoda	Canopus	9 54 14
March 9	The Dubbah, Bahr Zaraffo ..	Canopus	7 47 38
June 7	Towfikia	α Centauri	9 25 12
Nov. 7	„	Sun	9 25 25
„ 8	„	Sun	9 26 19
„ 9	„	Sun	9 24 5
„ 10	„	Sun	9 24 27
„ 10	„	Sun	9 24 59
„ 19	„	Sun	9 25 11
„ 21	„	Sun	9 25 1
1871. Jan. 11	The Dubbah, Bahr Zaraffe ..	Sun	7 46 47
Feb. 1	Three Dubbahs, Bahr Zaraffe	Sun	7 31 51
July 28	Gondokoro	Moon	4 56 28
1872. Jan. 20	„	α Ursæ Majoris	4 54 58
„ 20	„	γ Ursæ Majoris	4 53 49
„ 20	„	α Crucis	4 53 43
„ 24	Gebel Regiaf	α Crucis	4 45 22
„ 27	{ Sheikh Beden's, just below the rapids }	Canopus	4 37 49
Feb. 8	{ On the march from Sheik Beden's to Loboré }	Canopus	4 37 8
„ 9	Goboor	Capella	4 28 34
„ 10	Marengo	Capella	4 18 33
„ 11	Moogi	Canopus	4 6 37
„ 15	Loboré	Canopus	4 1 5
March 1	{ At the junction of Asua and Attabbi }	Canopus	3 42 38.
„ 3	At camp in the forest	Canopus	3 22 11
„ 5	Shooa	α Crucis	3 7 17
„ 10	Fatiko	α Ursæ Majoris	3 1 21
April 5	Foweera	α Lyrae	2 12 35
„ 14	Kisoona	α Ursæ Majoris	2 2 52
„ 16	Koki	α Ursæ Majoris	1 59 26
„ 19	Chorobézi	α Crucis	1 56 29
„ 28	Masindi	α Crucis	1 44 35
1873. Jan. 22	Fatiko	β Aurigæ	3 2 14
„ 22	„	Canopus	3 0 33
„ 23	„	Capella	3 1 28
„ 24	„	Capella	3 2 18
„ 25	„	Capella	3 2 38
„ 27	„	Capella	3 1 39
Feb. 6	„	Canopus	2 59 15

The results contained in the preceding Table having been combined as necessary, the following Table was formed:—

TABLE II.—*Concluded Latitudes.*

Name of Place.	Latitude North.	Number of separate Determinations.	Name of Place.	Latitude North.	Number of separate Determinations.
Khartoum	15 36 6	1	Goboor	4 28 34	1
Fashoda	9 54 14	1	Marengo	4 18 33	1
Towfikia	9 25 5	8	Moogi	4 6 37	1
The Dubbah, Bahr	7 47 13	2	Loboré	4 1 5	1
Zaraffe			At the junction of the	3 42 38	1
Three Dubbahs, Bahr	7 31 51	1	Asua and Attabbi		
Zaraffe			At camp in the forest	3 22 11	1
Gondokoro	4 54 45	4	Shooa	3 7 17	1
Gebel Regiaf	4 45 22	1	Fatiko	3 1 26	8
Sheikh Beden's, just	4 37 49	1	Foweera	2 12 35	1
below the rapids ..			Kisoona	2 2 52	1
On the march from	4 37 8	1	Koki	1 59 26	1
Sheikh Beden's to			Chorobezi	1 56 29	1
Loboré			Masindi	1 44 35	1

TABLE III.—*Results of the Observations for Longitudes from Lunar Distances.*

(In the reduction of these observations the 'Nautical Almanac' distances have been corrected for the errors of the places of the Moon and Planets as determined from the Greenwich Observations).

Date.	Name of Place.	Object to which Moon was referred.	Whether the Moon was East or West.	Resulting Longitude East.
1870. Oct. 29	Towfikia	Sun	E.	31 29 0
" 31	"	Sun	E.	31 15 15
" 31	"	Antares	E.	32 42 0
" 31	"	Saturn	E.	32 1 15
Nov. 7	"	Aldebaran	W.	31 33 45
" 7	"	Jupiter	W.	31 43 30
" 8	"	Jupiter	W.	31 24 45
1872. Jan. 18	Gondokoro	Fomalhaut	E.	30 48 15
" 18	"	Jupiter	W.	32 8 0
March 15	Fatiko	Jupiter	W.	32 37 0
" 16	"	Sun	E.	31 46 15
" 16	"	Jupiter	W.	32 58 0
" 17	"	Aldebaran	E.	32 9 0
" 17	"	Aldebaran	E.	32 6 30
" 17	"	Jupiter	W.	32 52 15

At one place (Fatiko) two observations of eclipses of Jupiter's satellites were made, the results of which are given in the next Table:—

TABLE IV.—*Results of the Observations for Longitude, from Eclipses of Jupiter's Satellites, made at Fatiko.*

(In the reduction of these observations the 'Nautical Almanac' times have been used without correction, no corresponding observations having been found.)

Date.	Phenomena.	Resulting Longitude East.
1872. March 17	Reappearance of 1st satellite	32° 37' 45"
1873. Feb. 6	Disappearance of 3rd satellite	32 35 45

Combining together the results of Tables III. and IV., the following values of longitude are found:—

TABLE V.—*Concluded Longitudes.*

Name of Place.	Longitude East.	Number of separate Determinations.
Towfikia	31° 44' 13"	7
Gondokoro	31 28 8	2
Fatiko	32 27 49	8

In addition to the above, several differences of longitude were measured by means of two chronometers.

TABLE VI.—*Chronometric Differences of Longitude.*

Names of Places.	Resulting Differences of Longitudes.
Khartoum, east of Fashoda	0° 21' 0"
Fashoda, east of Towfikia	0 30 45
Khartoum, east of Towfikia	0 51 45
Towfikia, east of the Dubbah, Bahr Zaraffe	1 3 15
Towfikia, east of Three Dubbahs, Bahr Zaraffe	1 3 15

The interval between the observations made before leaving Khartoum, and after arriving at Towfikia (taking Fashoda on

the way) was fourteen days, and the rates determined at Khartoum agree well with those afterwards found at Towfikia. The first three results of the preceding Table should therefore be good.

The last two differences depend on rates determined before leaving Towfikia, carried on twenty-nine days for "The Dubbah," and fifty-two days for "Three Dubbahs," there being no after determination of rate. These differences are therefore less worthy of confidence, although it may be noted as a favourable circumstance that in each case the two chronometers employed gave fairly accordant results.

V.—*Notes of Journey outside the Great Wall of China.* By S. W. BUSHELL, B.Sc., M.D., London University Scholar; Physician to H.B.M. Legation, Peking.

[Read, February 9th, 1874.]

ON September 2nd, 1872, the Hon. T. G. Grosvenor and the writer of these notes started together from the British Legation, Peking, on a trip through Inner Mongolia to Dolonnor, a large town founded by the Emperor Kang-hi, as a trading mart between the Chinese and the Mongolian tribes. About 25 miles north-west of Dolonnor are the ruins of the city of Shang-tu, the ancient northern capital of the Yuan dynasty, described in such glowing terms by Marco Polo, who was there in the reign of its founder, the famous Kublai Khan (A.D. 1280-94). Having explored these ruins, identified by the existence of a marble tablet with an inscription of the thirteenth century, we proceeded eastwards to the Muran Wei-chang, the imperial hunting-grounds of the reigning dynasty, thence to the city of Jehol, where Earl Macartney was received by the Emperor Chien-lung in 1793; and returned through the Ku-pei-kou Pass to Peking.

We left Peking early in the morning by one of the northern gates, and soon afterwards passed through a gap in the earthen rampart, which is all that remains of the old walls of Cambalu, which were 60 li (20 English miles) in circuit, and extended northwards and eastwards 5 li beyond the wall of the modern city. Thence the road lay through the northern extension of the great alluvial plain in which Peking is situated, which is bounded on three sides by ranges of hills.

In the western and eastern hills there are many Buddhist temples, pagodas, and monasteries; some picturesquely situated in the recesses of rocky glens, embosomed in groves of pine, chestnut-oak, and maple; others perched on the summits of the

highest peaks, like the little monastery of Miao-feng-shan, which looks down upon the plain from an elevation of more than 3000 feet. These form most pleasant abiding-places in the hot season, when the dust, dilapidation, and decay of Peking are left behind for a time.

To the left of the road the numerous buildings of the imperial Summer Palace of Yuan-ming-yuan are visible, in a semi-circular well-wooded valley. The outliers of the ranges are crowned with temples and pagodas, and in the distance the wall of an extensive deer-park is seen winding up the face of the "Fragrant Hills."

Farther on, beyond the walled city of Chang-ping-chou, a magnificent amphitheatre of hills appears on the right, encircling the scattered tumuli and sacrificial temples of thirteen emperors of the last native Chinese dynasty. The main approach to these tombs is by a wide paved road, nearly 2 miles in length, spanned by several treble marble arches, and flanked by two long lines of colossal figures of men and animals.

For the last 5 miles to Nan-kou, the walled town at the entrance of the famous pass, the way lay through a sandy, stony waste, strewn with large waterworn boulders. The rugged and precipitous hills in every direction are crowned with fortresses and watch-towers, and purposeless bits of wall are visible, winding round almost inaccessible peaks, built there, it is explained by the initiated, to exert a presiding influence over the elements, in accordance with the recondite mysteries of fêng-shui or geomancy.

The Nan-kou Pass is 40 li long (3 li to the mile), from its commencement to the gates of the Inner Great Wall, which winds deep down into the valleys and over the tops of the hills of the Pa-ta-ling range. The floor of the pass is thickly strewn with masses of rock: formerly traversed by a limestone causeway, the huge fragments thereof, uplifted and scattered by the force of the mountain torrent which rushes down in the rainy season, only serve now to increase the difficulties of the ascent. About 15 li from the entrance the limestone rocks are replaced by red coarsely-crystalline granite, and the pass contracts to a narrow defile bounded on either side by perpendicular cliffs. Here it is traversed by several walls, and defended by fortresses built over the massive gateways through which the road passes. This is the historical pass of Chü-yung-kuan, so called, according to tradition, from the fact that Chin Shih-huang (B.C. 246-10) resided there when superintending the completion of the Great Wall. One of the gateways is spanned by a hexagonal marble arch, ornamented with Buddhist mythological figures carved in deep relief, with

an inscription of the date 1345, a Buddhist invocation or dharani, in the characters of six different nations, Devanagari and Thibetan in horizontal lines, and below these, Mongol, Ouigour, Niuchih, and Chinese in vertical lines. This arch was originally the basement storey of a pagoda, which was pulled down, it is said, because the superstitious Mongols refused to pass underneath.

The end of the pass, 25 li farther on, is crossed by the Inner Great Wall at Pa-ta-ling, solidly built of massive blocks of granite quarried from the adjacent mountains. This has been often described and figured.

From Cha-tao, the small fortified town just beyond the Inner Great Wall, to Kalgan, a distance of 260 li, our road followed the valley of the Yang River, passing through many walled towns and villages belonging to the prefecture of Hsuan-hua-fu. A range of hills bounds the valley on the northern side, covered sometimes to the height of several hundred feet by terraces of the "loess" deposit; the road runs along the foot of this range. There is a break in the hills at the old post-station of Tu-mu, through which passes the main road to the Tu-shih-kou Pass, 235 li distant, branching off at right angles. At the fortress of Chi-ming-yi the road strikes the bank of the river, which here cuts through the range by a precipitous gorge, winding round the base of the rocky peak of Chi-ming-shan, so called, tradition relates, by an emperor of the Tang dynasty, who heard a cock crow from its summit, when encamped beneath on an expedition against Corea. The peak is crowned by a Buddhist temple at an elevation of about 2500 feet, approached by a steep winding path. It is composed mainly of coarse yellow limestone, burnt in many places for lime; on the northern side several seams of anthracite crop up to the surface, in which the openings of mines were visible from below. The road hugs the mountain side above the river, in some places cut deeply in the solid rock, till a few li beyond the hamlet of Hsiang-shui-pu, where it crosses a low range of sand-hills, and the large and important city of Hsuan-hua-fu breaks into view, in the midst of a fertile, well-watered plain, green with groves of poplar, willow, and sophora, interspersed with prolific fruit-orchards. The prefecture is generally celebrated for the abundance and excellence of its fruit: peaches, apricots, plums, pears, apples, cherries, persimmons (*Diospyros Schitse*), Shan-li-hung (*Crataegus pinnatifida*), melons, &c. &c., flourish, while grapes are widely cultivated, the vines trained over a wooden trellis-work in the Samarcand fashion. The principal natural productions, as detailed in the Chinese statistical works, are gold and silver, rock-crystal, chalcedony, and various kinds of agate, many

variegated and ornamental varieties of building stone, white and coloured alums, and anthracite; leopard and bear-skins, wild goat and antelope; bear's gall, deer's horns, and musk—all three important remedies in the native pharmacopœia. Of the well-to-do population a large fraction is Mahometan; the neat well-kept mosque is a conspicuous feature in every city and large village, while the Mahometan inns are generally distinguished for their comparative cleanliness and comfort.

The capital city is surrounded by a wall, 8 miles in circuit, and includes some large handsome buildings with large parks, while lofty memorial arches span the main streets. It is mentioned by Marco Polo under the old name of "Sindachu," and is still famed, as in his day, for its woollen and felt manufactures. There is a considerable Roman Catholic community, for whose spiritual wants a cathedral is now in process of erection, on the grounds of the mission within the city.

Having left the city by the main northern gate, we passed through a long stretch of uncultivated ground, occupied by fine old trees, between which the ruins of extensive buildings appeared, half-hidden by the tangled undergrowth: the site of a palace founded by the third emperor of the Yuan dynasty, called Chung-tu—the central imperial residence; abandoned, however, in the reign of his successor, who built instead a residence in the north-west of the department, and surrounded it with vast fruit-orchards.

The road proceeds northwards, striking the river just before entering Kalgan, and crossing by a stone bridge of many arches, ornamented with carved grotesque figures of lions and tigers.

Chang-chia-kou, also called Kalgan, from a Mongol word "Kalga," meaning gate or barrier, is the frontier town, commanding one of the most important passes between China and Mongolia, and the main road of the overland route between China and Russia. There is a walled fortress 4 li in circuit, but the merchants' houses, shops, and inns, form a long, straggling suburb, stretching from this, for some two or three miles, up to the gate of the Great Wall, which is strongly fortified and garrisoned. Just outside the gate one sees, on the right hand, a row of houses built in semi-European style, with large warehouses in the rear, belonging to the small community of Russian merchants, who send long caravans of camels, laden principally with brick-tea, over the Mongolian plateau to Urga and Kiakhta. From this spot radiate three passes, ascending to the edge of the plateau, distinguished as the western, central, and eastern roads, along each of which flows a small river, the three streams uniting at Kalgan to form the Ching-shui-ho. Following the

western road, which runs parallel to the Great Wall, bending as it does at Kalgan abruptly towards the north-west, we traversed first a precipitous gorge through the range of trachytic porphyry hills, and then gradually climbed up the long uniform ascent, on a deep sandy and gravelly floor, between low square hills of metamorphic schists, often overlaid by more recent loamy deposits, worn by the action of water into perpendicular cliffs. In the faces of these cliffs are built in many places the dwellings.—half caves, half mud-huts—peculiar to the “loess” formation of North China, sometimes in rows one above the other, like a huge pigeon-house. The sides of the hills on either side, where the slope is not too abrupt, are fringed with artificial terraces, and every available spot is under cultivation. Thirty li from Kalgan one passes a large aggregation of these huts, forming the village of Tu-cheng-tzu, and 10 li beyond this begins the sudden and difficult ascent up the precipitous face of the rocks which form the edge of the plateau.

Having surmounted this, the small village of Feng-kan-lu is soon reached. Here the Great Wall, which has hitherto followed the road in a more or less parallel direction, curves round towards the west. It consists of a mere heap of rubble, of rough unhewn fragments collected from the *débris* of the adjacent black volcanic rocks, and there are no traces of connecting mortar. Massive square towers, of solid brick with an earthen core, have been erected at intervals of two or three hundred feet, but they are now fast crumbling into ruin. This is known as the “Boundary Wall” by the Chinese, and was made probably during the twelfth century.

From the top of one of these towers, standing at an elevation of 5400 feet above the level of the sea, there is a magnificent and characteristic view. Stationed on the summit of the precipitous cliff-like edge of the Mongolian plateau, and facing southwards, one looks down upon an expanse of low, flat-topped hills, weathering in white perpendicular facets, bounded by the volcanic Kalgan range, which hides from view the valley of Hsuan-hua-fu; while beyond, in the far distance, the sharp and rugged peaks of the granite range, along which runs the Inner Wall, pierce the clouds. On either side nothing but mountains, crowned by the square towers of the Boundary Wall; eastwards bending round towards the Tu-shih-kou Pass, westwards visible, range upon range, far into the province of Shansi, until they fade away in the blue distance. Towards the north the eye ranges over a prairie with long wavy undulations, the first of the grass-covered Mongolian steppes. On the fixed natural line of demarcation between a settled agricultural people and nomadic pastoral tribes, we were passing from a region of limestone, coal-

measures, and granite, to one of tertiary and recent volcanic deposits; from the fertile, well-wooded valleys of Northern Chihli, rich in corn and fruit, to a "land of grass," the support of innumerable flocks and herds, where no tree is visible in a week's journey, and "argol," the dung of cattle, is the only fuel.

There is a corresponding difference in climate, and a cold biting north-west wind reminded us feelingly of the wide variation of temperature a few hours' journey had brought about. There are some settlements of immigrant Chinese on the border of the plateau, as well as about the stations of the north-east trade routes, but they earn with difficulty a miserable subsistence by the cultivation of oats, rape, and potatoes, which have barely time to come to maturity during the short-lived summer. There is small prospect of encroachment in this quarter; further east, where the country is hilly and the valleys fertile, as well as in Manchuria, the Chinese agricultural settlers are numbered by the million, and the aborigines are being either pushed to the north, or compelled themselves to become agriculturists.

Shipartai is the first station in Mongolia. It is a flourishing Chinese mart, situated in the midst of rich pastures, the source of the small river of Shipartai, which winds along towards the north-west to empty itself into the large lake Angoulinor. The settlement is surrounded by Mongol "yurts," belonging to the Chahar tribe. It is also a *dépôt* of bullock-carts—most primitive vehicles, made of a few rough planks with angular hexagonal wheels—which traverse the steppes in interminable trains, empty or laden with corn or manufactured goods, to return with crystals of nitre, salt, or impure carbonate of soda (natron), obtained by lixiviation from the soil of various parts of Mongolia.

The surrounding country is filled with lakes and pools of water, the haunts of innumerable flocks of waterfowl. We started with fresh ponies, and a Mongol lama as guide, to visit one of the largest lakes in the neighbourhood, the Ichinor, 60 li distant, and found the water black with waterfowl, which rose in dense flocks and filled the air with discordant noises. Swans, geese, and ducks predominated, and three different species of cranes were distinguished, but it was impossible to get within shooting range, from the total absence of cover. The lake is about three miles in circumference. Ten li to the south the ground gradually rises, forming a smooth, grassy elevation, raised a few hundred feet above the general level of the plateau. This is the Tengri Obo, one of the most sacred hills at which the Mongols worship. It is crowned by a cairn of

stones, heaped up around a central pole, and hung about with strips of silk and cotton, a relic of ancient nature-worship. On one side of the cairn a wretched wooden box was placed, enclosing a porcelain image of Buddha, a curious example of the incorporation of ancient superstition into a more modern form of worship. It was odd to observe our priest's looks of unutterable horror when one of us unwittingly offended by climbing to the top of the cairn to get a better view of the country; he afterwards made not a few propitiatory kotows.

The surrounding country is interesting from historical association, and there are many ruined towns in the vicinity. Forty-five li to the west the Lake Chagannor was visible, and on the bank the ruins of Chagan Balgasun, now known by the Chinese name of *Pai-cheng-tzu*, *i. e.* White City. This was founded by Kublai Khan; it was visited and described by Marco Polo. The emperor was in the habit of staying here some days during his journeys to and fro from Cambalu to Shangtu; he kept a number of falcons in mew, and made hawking excursions to the many lakes in the vicinity. The site was explored by the Russian traveller Timbowski in 1820, and is described in his 'Journey to Peking through Mongolia.'

From Tengri Obo we rode south-westwards through the pasture-land allotted for the breeding of horses, to the Yellow Manchu Banner. The whole of this part of Inner Mongolia, extending northwards from the Great Wall more than a hundred miles, is divided into tracts, apportioned to the Government boards and the various Manchu banners. We passed many herds of mares, while the men were busily engaged in cutting grass and stacking the hay in small heaps for winter consumption.

After 40 li, we arrived at the ruins of a once famous city, the Hsing-ho-cheng,* founded during the Liao dynasty (A.D. 907-1125), and the chief city of a "lu" circuit under the Yuan. The walls are 6 li in circumference, with the remains of four gates; it is completely deserted and overgrown with grass. The adjoining district is occupied by a small agricultural settlement of Chinese immigrants from the province of Shansi. Near the ruins flows the small river Bourgastai, and on the opposite bank of the river is the hamlet of Urtai, a station on the Russian caravan route. From Urtai to Shipartai is 50 li, over monotonous steppes, on the distant ridges of which a few antelopes are occasionally seen.

From Shipartai to Changmatz'ching, a distance of 130 li, the road follows the Dolonnor trade-route, and there are large bul-

* Known also by the Mongol name Kara Hotun.

lock-cart dépôts at frequent intervals. The only place worthy of note is Panshantu, where there is a military station and a Buddhist temple. Towards the end the country becomes more hilly, and antelopes abound, in herds sometimes of several hundreds.

Thence to Dolonnor is 250 li. Two rivers have to be forded—first a small stream, flowing westwards to empty itself into the Kere Lake; afterwards the River Shangtu, so called from the old city on its left bank; it becomes the Lan-ho in its lower course. Here it is a sluggish stream, about 10 feet wide, and easily fordable, winding through a marshy tract. There is a Chinese village on the left bank, with two good inns. After crossing this we came upon another smaller stream at Kapachiao, pursuing a winding course through a rich pastoral country towards a small lake. We kept in the valley of this, the Harapoulac River, crossing and re-crossing its bed, leaving it finally at Chapeng, a caravanserai 30 li from Dolonnor. The banks were dotted with Mongol encampments, at several of which we rested awhile, always most hospitably received, and given a cup of hot milk out of the caldron which occupies the centre of every tent, with occasionally a pat of fresh butter added. The Mongols of this part of the country live mainly on milk; the cream is heated till a thick pellicle forms on the surface, then folded like a pancake; the cheeses are small and round, less than 1 lb. in weight. The bullocks are large broad-ribbed animals, with long horns, usually of a red colour; in habit and appearance they resemble our Devon variety.

The general elevation of the plateau above the sea is nearly uniform, averaging 4500 feet, which is the altitude of Shipartai, while at Dolonnor it is 4300 feet.

Towards Dolonnor the ground becomes barren and sandy, and the loose sand is collected by the wind into moving hillocks, which enclose and separate a chain of lakes, from which the town derives its name (Dolon-nor being in Mongol Seven Lakes). The road winds round and between these small lakes, until suddenly a pagoda is seen ahead in a gap between two sand-hills, and soon after a large and populous town breaks into full view.

Dolonnor, commonly known by the Chinese name Lama Miao, from the large temples in its vicinity, was founded by the Emperor Kang-hi after the successful termination of his expedition against the Mongolian Prince Galdan, chief of the Eleuth tribes. It is now a flourishing town, with a trading population estimated at about 20,000, almost exclusively Chinese. A few handsome official residences, and one or two temples and pagodas, relieve the dull uniformity of the brick and mud shops.

and houses, closely packed together, and separated by narrow, dirty, and undrained streets. It differs from Chinese towns in the absence of the usual battlemented wall, being surrounded only by an earthen wall connecting the outer houses, enclosing a space of about a square mile, and having tall wooden gates at the ends of the principal streets, which are locked at nightfall. Dolonnor was visited by the Abbé Huc during his celebrated journey from the Roman Catholic station at the "Valley of Black Waters" to the capital of Thibet. It is famed for its numerous manufactories of bells, idols, and the multitudinous bronze paraphernalia employed in the Lama religious ceremonies, and of the smaller figures, talismans, and gaudily painted figures to be found in every Mongol tent. The silver-smiths display in tempting profusion the elaborate silver trappings and earrings, laden with coral, turquoise, lapis lazuli, and jade, with which the Mongol women love to adorn their coarse tresses, as well as necklets, bracelets, and rings, for which they exact the most extortionate prices. Other shops are filled with guns, pistols and swords, with saddles, bridles, and gay trappings, and the manifold products of Chinese civilisation, for which the Mongols barter their horses, bullocks, and sheep, and the various spoils of the chase. The average price of a good pony is five ounces of silver—the cost of a small copper idol; while a sheep is valued at one ounce—the retail price of a dozen small packets of needles, or half-a-dozen atrocious daubs of a many-headed deity. Beef, mutton, and game are in consequence cheap; but corn, fruit, and vegetables, having to be brought from a long distance, are correspondingly dear, with the single exception of potatoes, which flourish everywhere, and are peculiarly large and fine.

Dolonnor is situated within the northern bend of the Shangtu River,* which is 40 li distant to the north, 30 li to the east; the latitude has been calculated by Dr. Fritsche, Director of the Russian Observatory at Peking, to be 42° 16' 48", from data supplied by a Russian traveller.

On the third day after our arrival we rode to visit the ruins of the ancient Mongolian capital of Shangtu, situated 80 li to the north-west of Dolonnor, now known by the Mongol name of Chao naiman soumé Hotun—"the city of a hundred and eight temples." The road passed first over a series of low sand-hills, then crossed a steep range of volcanic hills, descending into a wide rolling prairie, covered with long grass and fragrant

* In all the maps that I have had an opportunity of consulting, Dolonnor is wrongly placed on the north bank of the river, it having been presumed, I opine, that it was built on the site of the city of Shangtu, which is really more than 25 miles distant.

shrubs, the haunt of numerous herds of antelope. This prairie gradually slopes down to the marshy bed of the river, here a considerable stream 20 feet wide; in former times flat-bottomed grain-junks ascended from the sea to this point, bringing up supplies of rice from the southern provinces for the use of the city and court. Now the only building in the neighbourhood is a small Lama monastery, the abode of some six or seven wretched priests, while a few scattered tents belonging to the Chahar tribe stand on the river-banks. The city has been deserted for centuries, and the site is overgrown with rank weeds and grass, the abode of foxes and owls, which prey on the numerous prairie-rats and partridges. The ground is but slightly raised above the bed of the river, which flows past the south-east at a distance of 4 or 5 li from the city wall, while it is overshadowed on the opposite side by the Hingan range of mountains, trending south-west, north-east, and rising into lofty peaks farther north. The walls of the city, built of earth, faced with unhewn stone and brick, are still standing, but are more or less dilapidated. They form a double enceinte, the outer a square of about 16 li with six gates—a central, northern, and southern, and two in each of the side walls; while the inner wall is about 8 li in circuit, with only three gates—in the northern, eastern, and western faces. The south gate of the inner city is still intact, a perfect arch 20 feet high, 12 feet wide. There is no gate in the opposite northern wall, its place being occupied by a large square earthen fort, faced with brick; this is crowned with an obo or cairn, covered with the usual ragged streamers of silk and cotton tied to sticks, an emblem of the superstitious regard which the Mongols of the present day have for the place, as evidenced also by the modern legendary name—"the city of 108 temples." The ground in the interior of both inclosures is strewn with blocks of marble and other remains of large temples and palaces, the outline of the foundations of some of which can yet be traced; while broken lions, dragons, and the remains of other carved monuments, lie about in every direction, half-hidden by the thick and tangled overgrowth. Scarcely one stone remains above another, and a more complete state of ruin and desolation could hardly be imagined, but at the same time everything testifies to the former existence of a populous and flourishing city. A broken memorial tablet was found, lying within the north-east angle of the outer city amid many other relics, on a raised piece of ground, the site evidently of a large temple. The upper portion, projecting above the surface of the ground, contained an inscription of the Yuan dynasty, in an ancient form of the Chinese character, surrounded by a border of dragons boldly carved in deep relief. This tablet

was erected by the emperor Shih-tsu (Kublai Khan), the founder of the Yuan dynasty, in memory of a Buddhist chief-priest of high rank, head of the monastery. The lower half of the massive marble slab lies doubtless buried beneath the grass, but we were unable to get at it for want of proper tools.

Outside the city proper as described above, there is yet a third wall, smaller than either of the others, but continuous with the south and east sides of the outer city wall. This is now a mere grassy mound, enclosing an area estimated at 5 square miles, to the north and west of the city. This must be the park described by Marco Polo, inside which were "fountains, and rivers, and brooks, and beautiful meadows, with all kinds of wild animals, which the Emperor has procured and placed there to supply food for his gerfalcons and hawks which he keeps there in mew. The Khan himself goes every week to see his birds sitting in mew, and sometimes he rides through the park with a leopard behind him on his horse's croup; and then if he sees any animal that takes his fancy, he slips his leopard at it, and the game when taken is made over to feed the hawks in mew."*

The city of Shangtu is referred to by Coleridge in his 'Dream of Kublai's Paradise':—

"In Xanadu did Kubla Khan

A stately pleasure dome decree:

Where Alph, the sacred river, ran,

By caverns measureless to man,

Down to a sunless sea.

So twice five miles of fertile ground

With walls and towers were girdled round:

And there were gardens bright with sinuous rills,

Where blossomed many an incense-bearing tree;

And here were forests, ancient as the hills,

Enfolding sunny spots of greenery."

A Chinese traveller, Wang Yun, who went in the suite of the emperor to Kai-ping-fu (the original name of Shangtu) soon after its foundation, says, "The walled city was founded in the cyclical year 'ping chen' (A.D. 1256), to the south of the Dragon Hill, with the Lan River flowing by on the opposite side. Encircled on four sides by mountains, it stands on a well-chosen site, in a luxuriant and beautiful country. To the north-east of the city, not more than 10 li distant, are large pine-forests, the habitation of many kinds of birds, especially the species called chapiku (a celebrated kind of falcon). The mountains are covered with fine trees; fish, and salt, and the hundred kinds of valuable natural products abound; and the

* Colonel Yule's 'Marco Polo,' ch. lxi.

flocks and herds flourish and multiply, so that the inhabitants have at hand an abundant provision of food. The river, though shallow, is broad; the water is frozen down to the river-bed in the cold season. The climate is cool in summer, extremely cold in winter, and altogether it is the coolest station in the north-eastern part of the empire. This, according to the geographical records, was part of the Wu-huan territory during the eastern Han dynasty. It is distant 45 li from the new city of Huan-chou."

Widely different, however, is the condition of the country in the present day. All around is dreariness and desolation. Even the natives were rude and inhospitable—the rarest case among the Mongols. The gates of the small monastery, where we had hoped to pass the night, were barred at our approach, and the priests on the other side obstinately deaf to arguments or bribes. Late as it was, we were perforce compelled to remount our ponies and gallop back as fast as they would carry us over the twenty-seven miles of hill and dale which separated us from Dolonnor.

The following day, September 17th, we devoted to the examination of the magnificent Lama temples and monasteries situated in the plain about a mile north-west of Dolonnor. The larger of the two, the Hui-tsung-ssu, was built in the reign of Kang-hi by contributions from the Mongol tribes. The emperor bestowed a name upon it in the 30th year of his reign (A.D. 1694), having erected at the same time in one of the principal courts a marble monumental tablet, inscribed in the characters of three languages—Manchu, Mongol, and Chinese—with verses commemorating his victories. The other temple is about a li distant towards the south-west; it was completed in the 7th year of Yung-cheng (1729), called by the emperor Shan-ying-ssu, and presented with a similar monument, having also a tri-lingual inscription. The temples are both surrounded by monasteries, long parallel lines of brick dwellings, enclosed by a low wall, in which the Lama priests live, in number amounting altogether to nearly three thousand. They are an ignorant, lazy, illiterate class, and collected round the strange visitors in crowds, open-mouthed and staring. The wide square faces, with projecting jaws, large mouths, and small porcine eyes, the foreheads low and receding, and the small bullet-like shaven skulls, were curious studies, exaggerating the more repulsive features of the Mongolian type. The vacuous, semi-idiotic expression of many—the large admixture of the maimed, halt, and hump-backed—the occurrence of faces deeply scarred and eyes destroyed from the ravages of small-pox, and of noses eaten away by caries—all combined to show that it is not the most intelligent of their

sons, nor those without blemish or spot, whom the Mongols devote to the service of Buddha. The temples, on the contrary, are truly gorgeous and well appointed, with lofty halls supported by pillars in the ordinary style of Chinese architecture, and interiors richly decorated with vermilion, and gold. Thibetan scrolls are engrossed on the walls and roof and cover the rich silk hangings and tapestry, and the Sanscrit characters of the mystic formula, "Ommané padmé oum," meet one at every turn. The huge images and prayer-machines, the yellow robes and Grecian helmets of the officiating priests, the musical instruments of the band, and all the paraphernalia of the Lama ceremonial, have been often described, and may be seen any day at the Great Lamassery of Peking. The reigning dynasty of China has always favoured its development, from the powerful hold it gives them over the superstitious Mongols. In few countries are the outward evidences of religion so universally apparent. Even the "heathen Chinese" of these parts palms off his sham jewellery, wrapped up in paper, inscribed "Ommané padmé oum," and prefaces his most exorbitant hotel bill with the same comforting formula.

From Dolonnor we journeyed eastwards, riding over a grassy plain till we came to the ridge of sandhills which separates the plain from the river valley. The river here averages 30 feet in width, still shallow and sluggish. We forded it at the hamlet of Ta-ku-shan. Twenty li farther on we traversed a pass in the volcanic range which forms a portion of the western boundary of the imperial hunting-grounds, and entered upon a wide uncultivated prairie, studded with patches of dwarf willow and elm, the feeding-ground of many herds of antelope. Having crossed this we struck the right bank of the Hsiao Lan River, and put up for the night at a large stockaded house.

The next day's journey was more than 40 miles, all through the hunting-grounds, during the whole of which not a single house was seen. After crossing the small river the country became gradually more and more broken till we came to another range of mountains trending north and south; the crest of this range, elevated nearly 5000 feet above the sea, we reached after a long gentle ascent, and descended by a winding rocky path the opposite face, steep and precipitous. From this point there is a most complete change in the scenery and general aspect of the country. The monotonous undulating plateau, sandy or covered with short herbage, treeless and barren, is replaced by a broken hilly district, the mountains green to their summits with abundant vegetation, clothed with an undergrowth of hazelnut, wild rose, wurana (oulana), and other berried shrubs, and fragrant with artemisia, the shady recesses filled with clumps of

elm, birch, maple, pine, and oak, while the numerous valleys of rich peaty soil are occupied by deeply-winding streams, and support a thick tangled growth of grass and legumes, two to three feet high, with groves of willow and poplar at frequent intervals.

This brief description may serve to give an idea of the nature of the country chosen and marked out by the Emperor Kang-hi, the second of the reigning dynasty, to be guarded and preserved for the autumn hunting expedition, which started annually from the summer palace at Jehol. Having ridden down several gently sloping and tortuous river valleys, we arrived at last late at night at the stockaded station, called Manitu Kalun, one of the Manchu guard-houses of the centre of the southern boundary of the hunting-grounds, situated at the head of the valley of the Yimatu River. There were stationed here a petty officer and four private soldiers of the Bordered White Manchu Banner. After a long parley they were induced to unbar the massive timber gates, and finally ensconced us in the best part of the house. We were most hospitably entertained for two days by the sergeant, a fine-looking veteran, who took great pride in a set of unusually large tiger's claws, the relics of an ancient adventure, which he wore at his girdle. He was even complacent enough to tell off one of his men to act as our guide on a shooting excursion.

The imperial hunting-grounds, styled the Muran Wei-chang—"muran" signifying deer-hunting in Manchu, "wei-chang" hunt, ing-grounds in Chinese—are described in the Chinese statistical works as lying outside the northern boundary of the prefecture of Cheng-te-fu (Jehol). They are surrounded by the territory of Mongolian tribes, having the Kalachin Banners on the east, the Chahar Banners on the west, the Parin and Koshihkoteng Banners on the north; bounded south-east by the Kalachin, south-west by the Chahar Blue and Bordered White Banners, north-east by the Ongniout, and north-west by the Chahar Blue Banner. The circumference is more than 1300 li, the diameter from east to west being over 300 li, from north to south over 200 li. The territory originally belonged to the Kalachin Aohan and Ongniout tribes, and was handed over by them to the Emperor Kang-hi during one of his autumn expeditions outside the Great Wall. The boundaries were then fixed, and willow stakes were afterwards set up to mark off the ground as sacred, while a decree was issued threatening severe punishments on any Manchu, Mongol, or Chinese who should thereafter be discovered hunting or shooting within the precincts. The grounds are guarded by a detachment from each of the eight Manchu Banners, which watches a certain portion of the boundary line. Each detachment is divided into five sub-divisions, and occupies five

kalun or guard-houses, so that there are in all forty kalun, situated in the river valleys and mountain passes, the channels of communication with the surrounding country. Where the ground is suited to agriculture, a certain portion was allotted to each station for its support, otherwise they were allowed a certain number of horned cattle. The Manchu officer in command of the whole has his yamen at Chang-san-ying, a large village situated about 30 li outside the southern boundary, in the valley of the Yisun River.

The accompanying map, based on the old Jesuit survey, and filled in from more recent Chinese sources, shows approximately the position and boundary (marked by a dotted line) of the Muran Wei-chang. The chief stations of the Manchu Banners are also indicated. The whole district is mountainous, the mountains increasing in height towards the north-west, where they merge into the Hingan range, which is described as of unknown breadth and extent, with peaks stretching far into the clouds, and as clothed for some distance from the base with trackless forests. The Mount Pecha of our maps, said to be 16,000 feet high, ought to be somewhere in this neighbourhood; the name, however, as applied to a mountain, was not known to the inhabitants of the districts we passed through, and I have failed to find it in the official geographical records. There is, however, a River Paicha flowing from the north of the Hairahan Mountains. The hunting-grounds give rise to an immense number of rivulets and streams, which may be collected into two groups—the one flowing southwards towards the Shangtu or Lan River, the other north-eastwards towards the Sirgai River, an affluent of the Siramuren.

During the reigns of Kang-hi and his immediate successors, an annual expedition was organised at the palace of Jehol, after the expiration of the hot summer months, in which the emperor was accompanied by his whole court, a long train of princes and mandarins, and an army of soldiers. The purpose of the expedition was to train and exercise the army in military manœuvres, more than purely for hunting. The princes of the neighbouring Mongolian tribes were also required to be in attendance, and to bring with them some thousands of mounted followers to assist in the grand battue. At the same time they were to be impressed with the military power of China, so as to be convinced of the uselessness of rebellion against the power of the emperor.

At the town of Huang-ku-tun (Poro Hotun), 120 li from Jehol, the road to the Wei-chang branches into two. The eastern road was the one usually taken, following the valley of the Yisun River, and entering the grounds just beyond Shih-pien-tzu, a village 90 li beyond Huang-ku-tun. The Wei-chang

is divided into sixty-seven smaller hunting-grounds, each one a plain at the source of one of the many smaller rivulets, distant from 2 or 3 to 50 li from each other, and named usually after the particular stream which flows from its borders. The names, distances, boundaries, bearings, principal hills, &c., of all these are minutely detailed in the Chinese work before me, but it would be tedious to recapitulate them here. Having entered the hunting-grounds, the imperial party proceeded in its tortuous course from one to the other of these plains, halting at each while the many horsemen and foot-soldiers, formed into a huge ring enclosing mountain and valley, gradually converged, driving before them the game towards the place selected, where it was brought down by the spears and arrows of the emperor and his courtiers. The circuit completed—a task of at least a month—they emerged from the grounds at Pan-chieh-ta, distant 180 li from Huang-ku-tun, by the valley of the Yimatu River. After the reign of Chien-lung the expedition began to be made only at irregular intervals, and since the time of his successor Chia-ching, who died in 1820 on his return from hunting, no emperor has undertaken the journey. The Emperor Chien-lung built a succession of “travelling palaces” along the whole route, from the Great Wall at Ku-pei-kou to the two entrances into the grounds, at distances from each other of about 60 li—an easy day's journey. They are situated in picturesque spots on the sides of the hills, embosomed in groves of fir, and consist of a series of halls and open courtyards, with a shady arbour on the hill behind, in addition to side buildings and barracks in front for the guard. Of late years they have been sadly neglected, and they are now fast falling into ruin.

The wild fauna of the district is extensive and varied. The carnivora include the tiger (*Felis tigris*, L.), the leopard (*Felis pardus*, L.), and the *Felis irbis*, Müll.; the common wolf (*Canis lupus*, L.), the *Canis rutilus*, Pall., and the *Canis procyonoides*, Gray; the fox (*Canis vulpes*, L.), and two kinds of bears (*Ursus* sp.). The tiger is of large size, lighter in colour, and with longer and thicker fur than its Indian congener. Two fine stuffed specimens, with conspicuous fangs and prominent claws, are to be seen mounted in one of the side halls of every large Lama temple. The leopard, however, is more common, and especially feared by the country people, who always carry on their journeys a stout dagger-blade, mounted like a spear at the end of a stout pole, to defend themselves against its attacks. Every house is enclosed in a stout corral or timber palisade, into which the cattle and pigs have to be driven at night, safe from the assaults of the wolves which come down from the mountains, howling up to the barrier and making night hideous.

Among the ruminants are found the huangyang (*Antilope gutturosa*, Pall.), and the shanyang (*Antilope crista*, Temm.), the ahu (*Cervus capreolus*, L., var. *pygargus*, Pall.), and two other species of *Cervus* (*C. elaphus*, L., and *C. xanthopygus*, M. Edw.), the argali (*Ovis* (*Egoceras*) *argalis*, Pall.), and the musk-deer (*Moschus moschiferus*, L.).

Hares are very numerous, belonging to the species *Lepus variabilis*, Pall.

Feathered game is also most abundant. Of pheasants four species occur: the *Phasianus torquatus*, Gm. (*sinicè* yeh chi), found in every valley; the *Phasianus Reevesii*, Gr. (*sin.* chih chi), with magnificent tail-feathers, six feet long; the *Pucrasia xanthospila*, Gr. (*sin.* sung chi); and the gorgeous *Crossoptilon mantchuricum*, S. W. (*sin.* huo chi). Of partridges there are two species: the *Perdix barbata* (*sin.* pan chi), and the *Perdix chukar*, Gould (*sin.* shih chi). Quails (*sin.* an-chun) also abound. The lakes and pools are filled with an infinite variety of wildfowl, of all sizes and many-coloured plumage.

After a short stay we left our comfortable quarters at the Manitu station with much regret, and followed a south-easterly valley for a few li, till we reached a square brick round-topped tower, called Pan-chieh-ta. This marks the limit of the Weichang in this direction, and at this point begins the large and rich prefecture of Cheng-te-fu, which extends southward to the Great Wall, eastward to the Palisade boundary of Manchuria. We proceeded down the valley of the Yimatu River, a populous agricultural district, varying in breadth from a few hundred yards to more than a mile, bounded on either side by lofty hills of secondary limestone and coarse conglomerate. Towards the end of the second day we left the valley, crossed the eastern range of hills, and descended upon the important and picturesque town of Huang-ku-tun, formerly known by its Mongol name of Poro Hotun. This occupies the valley of the Yisur River, the houses clustering about the left bank and swarming up the hill-side, with one of the imperial hunting-boxes, surrounded by groves of pine and larch, in the back-ground. It is situated at the point of junction of the two main roads from the hunting-grounds.

The river valleys of this district are densely populated by Chinese immigrants, and flourishing well-built villages, each with its Buddhist temple, two or three inns, and comfortable-tilled cottages, occur at intervals of a few li. The ground is fertile and well cultivated, often channelled for artificial irrigation, while the steep hills are terraced to the height of several hundred feet. Rice, wheat, barley, maize, and buckwheat, the various kinds of millet, and other cereals; the many varieties of

pulse; linseed, hemp, castor-oil, and other oil-producing seeds; tobacco and the opium-poppy, the yam or sweet-potato; in short, all the plants cultivated in the plain of North China, flourish abundantly. The castor-oil plant, which usually borders the roads and pathways, grows often to the height of 10 feet, indicating the fertility of the soil.

The aboriginal Mongolian tribes of this part of the country have been altogether expelled. Farther north they are being yearly pushed back more and more by the rapidly encroaching peasant hordes. Eastward in the district of Pa-kou the Mongols themselves have taken to agriculture, and build permanent villages of small hive-like mud huts, modelled after the form of their old felt tents. In these river valleys, on the other hand, not a single Mongol remains, where two centuries ago the land belonged to them exclusively. The rivers, hills, and natural features of the country all retain their original names, though often disguised by the vile Chinese pronunciation. The common name "Shipartai," for instance, meaning originally "plain meadow-land," has become, both in the spoken and written tongue, "Shih-pa-li-tai," which signifies "eighteen li terrace;" and if you ask a Chinaman the derivation thereof, he will certainly tell you, "Why, of course, because it is 18 li from Huang-ku-tun." It happens to be about eighteen li from the town; but this is not the correct solution of the problem for all that. Similarly of many other places—if you enquired for Manitu station you would perhaps not be understood; every Chinaman knows it as Mantou (bread) station. The majority of the new towns and villages, on the other hand, are provided with more prosaic names of purely Chinese derivation, but chosen on no regular system, so that there may be a dozen villages of the same name in different parts of the country.

After leaving Huang-ku-tun we followed the road which leads to the valley of the little river of Shipartai, and kept parallel to the river till we arrived at the large village of Chung-kuan. From this point we proceeded down the picturesque valley of the Je-ho—"the hot river"—which takes its name from the numerous hot springs from which it derives its source, till we reached the city of Cheng-te-fu, the capital of the department.

This department was founded and its divisions and boundaries established in the reign of the Emperor Kang-hi. It was originally divided into five "ting:" Je-ho-ting in the centre, Kara Hotun-ting to the south-west, Ssu-chi-ting to the north-west, Pa-kou-ting to the east, and Tatzu-kou-ting to the east of the last. Afterwards a separate district was made out of the northern portion of Pa-kou-ting, and styled Wulan Hata-ting,

while the eastern part of Tatzu-kou-ting was cut off to form San-tso-ta-ting.

In the 43rd year of Chien-lung (A.D. 1778), the system was remodelled and assimilated to that of the Chinese provinces, the names being changed to those which they still have. Je-ho-ting was elevated to the rank of chief city of a prefecture, styled Cheng-te-fu, including within its bounds the remaining six, of which Pa-kou-ting was made a city of the second order, and called Ping'-chuan-chou; the other five cities of the third order, and their names changed to Lan-ping-hien, Feng-ning-hien, Chih-feng-hien, Chien-chang-hien, and Chao-yang-hien. The prefecture forms part of the province of Chih-li. These changes were made nearly a century since, but the obsolete names are still retained in our maps.

The accompanying table, compiled from the official statistics of the department, will give an approximate idea of the relative sizes, distances, and population of the various districts:—

Modern Name.	Ancient Name.	Diameters in Chinese Li.		Distance from Chief City.		Population. Census of 1792.		Population. Census of 1827.	
		N. to S.	E. to W.	Direction.	Li.	Families.	Individuals.	Families.	Individuals.
Cheng-te-fu ..	Je-ho ..	258	133	..	..	8,979	41,496	16,339	110,171
Ping'-chuan-chou	Pa-kou ..	490	540	E.	180	29,315	154,308	20,449	158,055
Lan-ping-hien ..	Kara Hotun	268	440	S.W.	40	5,230	26,630	6,914	45,769
Feng-ning-hien	Ssu-chi ..	220	520	N.W.	180	20,871	72,079	22,198	115,973
Chih-feng-hien ..	Wulan Hata	320	270	N.	540	6,314	22,378	14,999	112,604
Chien-chang-hien	Tatzu-kou	685	260	S.E.	360	23,730	99,293	31,996	163,875
Chao-yang-hien	San-tso-ta	530	260	N.E.	640	15,356	61,220	31,751	177,432
Total						109,795	477,404	144,646	883,879

It appears from this table that the aggregate population of the department increased from 477,404 to 883,879 in 35 years, and if, as is probable, it has since continued to multiply in like ratio, it must now (1872) amount to nearly two millions. Ping'-chuan-chou is an exception to the rule of rapid increase; in fact, although there is a slight increase in the population, the number of families appear to have decreased by nearly one-third in the same period, a result to be explained only by the occurrence of large emigration. This district is inhabited principally by Mongols, who are gradually taking to agricultural pursuits.

The next table shows the area of ground under cultivation in the first four districts in "ching" and "mou," the "ching"

being equivalent to about 16·7 acres; and also the amount of the land-tax in taels, one tael equivalent to six shillings of our money.

	Area of Ground Cultivated by				Land Revenue in Taels.	
	Bannermen.		Chinese.		Bannermen.	Chinese.
	Ching.	Mou.	Ching.	Mou.		
Cheng-te-fu	850	84	1,999	52	394	3,849
Ping'-chuan-chou	3,370	86	438	19	3,120	917
Lan-ping-hien ..	1,254	12	713	26	463	1,223
Jeng-ning-hien ..	2,847	82	11,336	74	3,996	5,966

Thus, in the year 1827, more than 380,000 acres of cultivated ground were taxed, in these four districts alone. The immigrant Chinese, coming mainly from the three provinces of Shansi, Shantung, and Chih-li, push on year by year up the fertile river valleys. The larger carnivora, the deer and antelope, are being driven to the mountains and gradually exterminated, and the Mongols deprived of their favourite hunting-grounds.

In addition to the crops mentioned on a former page, the indigo plant and silkworm mulberry are largely cultivated towards the south, and Ping'-chuan-chou is specially famed for the excellence of its silk manufactures, produced from the silk of the worm which feeds on the leaves of the wild "Po-lo-shu," the *Quercus obovata*.

The approach to the city of Cheng-te-fu from the north, by the winding valley of the Je-ho, is most effective and picturesque. Emerging from the gorge through the bold precipitous hills, which weather into the most grotesque forms, with huge oblong masses of conglomerate supported by a needle-point on the apex of a crag, or overhanging the brink of a precipice, one comes suddenly upon a beautiful scene. The valley in front widens out and branches off into several smaller transverse gullies, between round-topped gravel hills, covered with pine and elm, enclosing some scores of Lama monasteries and temples, which meet the view in every direction; to the right the long wall of the imperial palace winds over hill and valley, enclosing lofty well-wooded peaks, on the tops of which are perched small arbours; while below and in front, at some distance, are seen the straggling houses of the large unwall'd city filling the narrowing end of the valley.

The largest and most important of the Lama temples is the Putala-ssu, built in a peculiar and striking style of architecture, on the model, it is said, of the palace of the Grand Lama of

Thibet at Putala, in the neighbourhood of Lassa. The principal building of this temple is a huge square erection, with eleven rows of windows, the storeys coloured alternately red, green, and yellow, surmounted by a row of five gilt dagobas, and with the roof covered with enamelled tiles of a bright turquoise-blue colour. The general effect is inexpressibly *bizarre*; but the whole is an elaborate sham, the windows are mostly false, and the building a mere shell, enclosing and concealing a hall with the roof supported by wooden pillars in the ordinary style of Chinese architecture. This is described in Staunton's 'Account of Macartney's Embassy,' and there is a fair representation of the external aspect in the accompanying 'Atlas.' The next largest temple is a similar imitation of the Palace of Tesü Lhumbo, the residence of the Teshu Lama of Thibet. The numerous other temples on the hill-sides and in the adjacent valleys do not call for a detailed description.

Having struck the palace-wall, one rides along it for about a mile on the solid stone causeway raised above the bed of an old lake, and arrives at the city after crossing a substantial stone bridge. The palace, called the "Pi-shu-shan-chuang," the "mountain lodge for avoiding heat," was constructed in the year 1703, on the plan of the Summer Palace of Yuan-ming-yuan, near Peking. It is surrounded by a substantial brick wall more than six miles in extent, running along the summit of the range of hills which encircles the valley towards the west and north. This wall encloses the many halls and pavilions, the temples and pagodas, the gardens and rockeries, which constitute the typical Chinese palace. It was in the interior of this that Earl Macartney was admitted to an audience by the Emperor Chien-lung, in 1793, "in a spacious and magnificent tent supported by gilded, or painted and varnished, pillars. His Excellency and suite were conducted through the pleasure-grounds of a vast enclosure, forming however only a part of those great gardens, the remainder being reserved for the use of the female part of the imperial family. They rode through a verdant valley, in which several trees, particularly willows, of an uncommonly large girth, were interspersed, and between which the grass was suffered to attain its most luxuriant height with little interruption from cattle or the mower. Arriving at the shores of an extensive lake of an irregular form, they sailed upon it till the yachts, in which they were embarked, were interrupted by a bridge thrown over the lake in the narrowest part, and beyond which it seemed to lose itself in distance and obscurity. The surface of the water was partly covered with the 'lien hwa' (*Nelumbium speciosum*). The party stopped at a number of small palaces, near the water-edge, there being no

one very considerable edifice. There were other buildings erected on the pinnacles of the highest hills, and some buried in the dark recesses of the deepest valleys. They differed in construction and ornament from each other, almost every one having something in the plan of it analogous to the situation and surrounding objects, but within each was generally a public hall, having in its midst a throne, and a few side-rooms: the whole furnished with works of art from Europe, and rare or curious productions of nature found in Tartary. In continuing their ride, the party found that the grounds included the utmost inequality of surface; some bearing the hardy oaks of northern hills, and others the tender plants of southern valleys. Where a wide plain happened to occur, massy rocks were heaped together to diversify the scene; and the whole seemed calculated to exhibit the pleasing variety and striking contrast of the ruggedness of wild, and the softness of cultivated, nature." This vivid and accurate description is some compensation to the modern traveller for not being allowed personally to explore the sacred precincts.

The city of Cheng-te-fu or Jehol consists of one long tortuous main street, extending for some 2 miles from the river-bank, with many smaller streets jutting out at right angles. The official yamens, temples, inns, shops, and private houses are precisely similar to those of a flourishing Chinese city of the same rank, but, like other Mongolian cities, it is not surrounded by a wall. It is noted for the manufacture of a peculiar kind of inlaid mosaic work, and large quantities of boxes, tables, and other furniture, in which the walnut, elm, and variously coloured woods in which the surrounding country abounds, are worked into intricate patterns, are made here for exportation. The population is almost exclusively Chinese, with the exception of the large community, to be numbered by the thousand, of the priests of the Lama temples and monasteries, who are generally either of Mongolian or Thibetan extraction. The citizens collected in crowds to attend the strange men from the West in their walks through the streets, and unwelcome shouts of "foreign devils" were raised by the rabble on the outskirts of the crowd, but the more respectable people at once checked all hostile demonstration on being appealed to. A Chinese mob is troublesome from its insatiable curiosity, following one into shops, and particularly fond of examining the texture of one's clothes, speculating wildly on the original cost thereof; all of which would not be so unendurable, were it not for the overpowering fumes of the garlic with which it is always saturated. It is, as a rule, peaceable, and even when otherwise disposed it is peculiarly susceptible to a seasonable joke or an appropriate

touch of satire, which the bystanders will appreciate, even if the victim does not.

The road to Lan-ping-hien, which is only 40 li from Jehol, follows first the south wall of the palace, and then ascends the steep and rocky side of the ridge of Kuang-jen-ling, "the peak of broad benevolence," so named, as commemorated by the inscription on a marble tablet on the top, by the Emperor Kang-hi, after the road had been made by him at vast expense, the rocks, of hard coarse conglomerate, having been chiselled in some places to the depth of several feet. The descent on the opposite face is no less steep; after accomplishing which we rode for some miles over an undulating agricultural country, till we came again to the Lan-ho, the same river which was so often forded about Dolonnor. Here it is much wider and more rapid, and we had some difficulty in fording it to cross to the town of Lan-ping-hien, situated on the right bank of the river. This is also an unwallled city, of the third rank, the capital of an agricultural district; it was formerly known by the Mongol name of Kara Hotun, which is totally unfamiliar to the natives of the present day. The city is dull and uninteresting, the only picturesque point being an imperial travelling palace, with its usual halls and pavilions, environed by a thick grove of trees, on the side of the hill across the river.

From Lan-ping-hien to Ku-pei-kou is a distance of 100 li by the most direct route. The road passes through valleys and over several ranges of hills, but on the whole gradually descends. The most difficult pass is about 10 li beyond the village of Ma-chuan-tzu, where the road ascends to the top of a ridge of more than 2000 feet, surmounting one after another the "eighteen platforms" thereof, and descends on the opposite face, along the rough bed of a mountain torrent, of the steepest and most difficult description, filled with huge boulders of granite, limestone, and conglomerate heaped one above the other. This excels even the Nankou Pass in roughness, and, as in that, the remains of a stone causeway are mingled confusedly with the débris of the overhanging cliffs, and only a few of the more solid bridges across transverse torrents yet remain in tolerable preservation.

The road soon became easier, and we passed into one of the frequented trade-routes, meeting and overtaking many large caravans. The principal cargo appeared to be wood, previously sawn into beams and planks, and carried southwards by powerful camels. The approach to Ku-pei-kou on this side is by a broad, level, and sandy river-valley, crossed by the Great Wall. The Wall here has been well described, and plans and sections given in Staunton's book quoted above.

Branches jut out in all directions, reaching to the various summits of the basin of hills, deep down in the centre of which lies the walled and fortified town of Ku-pei-kou, with a wide, sluggish river winding along close under its walls, towards the precipitous gorge by which it finds its way into the great plain of China. It is a bustling commercial mart, but chiefly famous, at least according to our notions, for its delicious fragrant honey, produced by the wild bees which swarm in the mountains surrounding the Tung-ling. On the heights to the south of Ku-pei-kou a large garrison is stationed; and here is the last line of fortification, through the massive stone gateway of which, rejoicing in the name of "the gate of the southern paradise," we had to pass.

Having forded the river, which flows by just beneath these heights, we made all speed to get over the 240 li of familiar and uninteresting country which separated us from Peking—an arable district, with many walled cities and villages. We reached one of the western gates of the celestial capital on the afternoon of the second day, both ourselves and our ponies well pleased to arrive at comfortable quarters after one month's constant travelling.

APPENDIX.

1. ITINFRARY OF JOURNEY.

From	To	Li	From	To	Li
Peking (Anting Gate)	Ch'ing ho	18	Dolonnor	Chao naiman sourné Hotun (Shang tu)	80
Ch'ing ho	Sha ho	30			
Sha ho	Nan k'ou	50	Dolonnor	Ta ku shan	30
Nan k'ou	Chu yung kuan	15	Ta ku shan	Hsiao lan ho'rh	60
Chu yung kuan	Ch'a tao	30	Hsiao lan ho'rh	Manitu k'alun	120
Ch'a tao	Yu lin	25	Manitu k'alun	Sulu ying tzu	40
Yu lin	Huai lai hien	25	Sulu ying tzu	Liu ku ying tzu	40
Huai lai hien	T'u mu	30	Liu ku ying tzu	Lama seng ch'a tzu	40
T'u mu	Sha ch'eng	20			
Sha ch'eng	Hsin pao an	20	Lama seng ch'a tzu	Pa ta ying tzu	35
Hsin pao an	Chi ming yi	20			
Chi ming yi	Huang shui p'u	30	Pa ta ying tzu	Huang ku t'un	45
Hsiang shui p'u	Hsuan hua fu	30	Huang ku t'un	Shipartai	18
Hsuan hua fu	Hai yu lin	30	Shipartai	Chung kuan	42
Hai yu lin	Chang chia k'ou (Kalgan)	30	Chung kuan	Kao asti tai	12
Chang chia k'ou	Wang kan lu	45	Kao asti tai	San tao ho	38
Feng kan lu	Shipartai	40	San tao ho	Ch'eng te fu (Jehol)	20
Shipartai	Lichinor	60	Ch'eng te fu	Lan p'ing hien	40
Jehinor	Hsing ho ch'eng (Kara Hotun)	45	Lan p'ing hien	Wang chia ying tzu	80

1. ITINERARY OF JOURNEY—(continued.)

From	To	Li	From	To	Li
Hsing ho ch'eng	Shipartai	50	Wang chia ying	San tao liang	20
Shipartai	Pai miao tzu	20	tzü	Ma chüan tzu	30
Pai miao tzu	Pan shan tu	40	San tao liang	Shai shu kou	20
t'an	Tong lo ssü	35	Ma chüan tzu	Liang chien fang	20
Pan shan tu	Chang ma tzu	35	Shai shu kou	Ku pei k'ou	40
Teng lo ssü	ching.		Liang chien	Shih hsia	40
Chang ma tzu	Hsiao ho'rh	35	fang	Chao tu ch'uang	20
ching	Shang tu ho'rh	45	Ku pei k'ou	Mu chia yü	20
Hsiao ho'rh	Ta liang ti	40	Shih hsia	Mi yun hien	20
Shang tu ho'rh	Kapach'iao	30	Chao tu ch'uang	Lo shan	30
Ta liang ti	Erh teng ch'üan	30	Mu chia yü	Niu lang shan	20
Kapach'iao	Ch'a p'eng	40	Lo shan	San chia tien	20
Erh teng ch'üan	Dolonnor (Lama	30	Niu lang shan	Sun ho	30
Ch'a p'eng	Miao)		San chia tien	Peking (Tung-	30
			Sun ho	chih Gate)	

2. TU SHIH K'OU ROUTE.

Nan k'ou	T'u mu	125	Yun chou	Tu shih k'ou	60
T'u mu	Chang kan ling	50	Tu shih k'ou	Chilun Balgasun	50
Chang kan ling	Tiao hsiao pu	50		(Shih t'ou	
Tiao hsiao pu	Ch'ih ch'eng	45		ch'eng)	
Ch'ih ch'eng	hien		Shih t'ou ch'eng	Shang tu ho'rh	40
hien	Yun chou	30	Shang tu ho'rh	Dolonnor	170

3. DIRECT TRADE ROUTE FROM DOLONNOR TO KU PEI K'OU.

Dolonnor	Sha to Tzu	25	Kuo chia t'un	Shan shen miao	30
Sha to tzu	Ch'uan shan tzu	15	tzü liang	tzü liang	
Ch'uan shan tzu	Shui chüan tzu	15	Shan shen miao	Niu chüan tzu	20
Shui chüan tzu	Kou men tzu	45	tzü liang		
Kou men tzu	Ch'ing shih la	20	Niu chüan tzu	Feng ning hien	50
Ch'ing shih la	P'ien ts'ao liang	10	Feng ning hien	Po lo nao	50
P'ien ts'ao liang	Pai yang kou	35	Po lo nao	An Chiang t'un	50
Pai yang kou	Mohulu kou	32	An Chiang t'un	San ch'a h'ou	50
	liang		San ch'a k'ou	Ku pei k'ou	30
Mohulu kou	Kuo chia t'un	50			
liang.					

VI.—*Notices of Southern Mangi.* By GEORGE PHILLIPS, H.M. Consular Service, China. With Notes and Remarks by Colonel HENRY YULE, C.B.

[Read, February 9th, 1874.]

DURING the past ten years two editions of Marco Polo's Travels have been given to the public—one by M. Pauthier, a great Chinese savant, the other by Colonel Yule, a great Oriental scholar. Both of these editions are full of the most varied

Oriental learning and most recondite notes, reflecting the highest credit upon the industry and attainments of their respective editors, and leaving nothing, it would seem, for future critics to comment upon. There is, however, one part of the book that has not met with such accurate commentary as it deserves: I allude to that part which treats of the cities of the southern division of Mangi, passed through by our traveller on the way to his port of embarkation, Zayton, which cities have nearly all been erroneously identified. I purpose, therefore, in a few short notes to bring forward my arguments in support of what I consider the correct identification of the particular places in question, which I feel I am justified in doing from the fact of having personally gone over the greater part of this ground described by our great medieval traveller, and also from the fact of having for a long time past made the history of the localities in question my especial study.

For the cause in hand, I will take up our traveller's history at Que-lin-fu, which can, I think, without fear of contradiction, be identified with the present city of Kienning-fu. After three days' journey from this city of Que-lin-fu (Kienning-fu), our traveller informs us that he reached a city called Unguen, or Unken, where there is an immense quantity of sugar made. This Unguen or Unken I identify with the present city of Yung-chun-chow, locally called Eng-cheng. The distance from Kienning-fu to Yung-chun-chow is 300 Chinese li, a space easily travelled over in three days, which agrees with the time occupied by Marco Polo in passing from Que-lin-fu to Unguen. The resemblance in sound between Eng-cheng and Unguen is also very near. Sugar is largely grown in the neighbourhood.

Fifteen miles farther from this city of Unguen, mention is made of a city, called by Ramusio in his edition of our traveller's work, Kangiu, and in almost all others, Fuju.

Fuju has been the reading accepted by most commentators, and from its great resemblance in sound to Fouchow, has been identified with that city. From the accepting of this reading as the correct one, and the ignoring of Ramusio's reading, Pauthier, in his edition of Marco Polo, has fallen into some amusing errors, altering, in one case, the course of the Fouchow River to suit his particular views, concerning which he gravely informs us that this river (the Min) does not flow by Fouchow now as it did in Marco Polo's day; while, unfortunately for his theory, a magnificent bridge, first erected long before Marco Polo's time, spanned then, as now, the river at Fouchow, connecting its northern and southern shores.

I am in favour of Ramusio's reading, and consider his Kangiu to be the correct one, and have no hesitation in identifying it

with the city of Chuan-chow-fu, locally called Choan-chin, and commonly known among Europeans as Chinchew. There is sufficient resemblance in sound between Kangiu* and Choan-chin, to justify us in considering it one and the same place; but, apart from this, I will, from internal evidence, taken from the various descriptions of the place, prove that this Kangiu, otherwise Fujū, cannot possibly have been Fouchow.

For example, in some editions mention is made of Fujū being the capital of the kingdom called Chonka. By this Chonka, Fookien appears to be meant. Now, Fouchow or Fujū was not the capital of Fookien in Marco Polo's time, but Choan-chin was.

Further, "many vessels arrive at this port from India, freighted by merchants, who bring with them rich assortments of jewels and pearls, upon the sale of which they obtain a considerable profit."

This statement alone destroys all claims that may be brought forward in support of Fouchow being considered the Kangiu or Fujū of Marco Polo; for ships from India did not frequent Fouchow in Marco Polo's time, nor was there ever any foreign trade carried on there till the commencement of the 18th century.

The only ports in Fookien carrying on trade with foreign countries in Marco Polo's day, were Choan-chin and Geh-kong, of which latter place more anon.

After five days' journey from Kangiu, our traveller arrived at the noble and handsome city of Zaitun, which has a port on the sea-coast celebrated for the resort of shipping loaded with merchandise, which is afterwards distributed through every part of the province of Mangi.

Klaproth identifies Zaitun with Tsze-tung, an ancient name of Choan-chin.

I cannot accept this theory, feasible as it may appear.

Fortunately for us, in the edition of Marco Polo, published by the Geographical Society of Paris, there is a list given of the various readings of places as found in other editions, and among the names given to Zayton, we find Carcon, Caykong, Sarcam, and Tarcam.

These several editions of Marco Polo are not singular in giving other readings of this name Zayton.

In D'Herbelot's '*Bibliothèque Orientale*' we are informed that it is a maritime town of China, also called Scheikham by the Arabs, and, more curious still, Schengiu by the Chinese.

* The name in Ramusio is Cangiu, or rather Cagiu. The name in the other and older forms of the work is Fugui or Fugiu, which, rendered in English spelling, is *Fuju*. But if we write Fujū, we should also write *Kanju*. So also, further on, Tingiu should, on the same system, be *Tinju*.—H. Y.

Friar Odoric makes mention of the place under the names of Carchan, Caiton, and Zaiton, and speaks of it as a city twice as large as Bologna.

With such readings of the place as Caykong, Carcam, Carchan, and Scheikham, I am enabled to fix with almost positive certainty the locality here indicated.

During the Middle ages, Chinese local histories inform us that there was situated near the mouth of the Changchow River, about twenty miles from the present treaty port of Amoy, a large commercial emporium trading with foreign countries, called Yuch-kiang, and in the dialect of the place Geh-kong. In this Geh-kong I recognise Marco Polo's Caykong, the Arab Scheikham, and Friar Odoric's Carchan.

I am unable to give any satisfactory solution as to the derivation of the name Zayton, which appears to have been the name by which Geh-kong was so well known among traders and travellers in the Middle Ages.

D'Herbelot also states that the Chinese called it Schengiu, which is really no other than the city of Changchow, situated about fifteen miles further up the river, of which Geh-kong, at its mouth, was the port.

Edrisi, in his 'Geography,' makes mention of Changchow under the name of Djankou, and speaks of it as a town remarkable for the beauty of its buildings and its fine markets, and of the fruitfulness of its gardens and its orchards. Mention is also made of its great silk manufactures, and that everything is as readily procured there as at Kanfu (Canton).

This account of Changchow given us by Edrisi dates back as far as the middle of the twelfth century; and, as early as the end of the ninth century, Chinese records inform us that foreign ships resorted to this neighbourhood.

It was about 1086 that the marshes in the neighbourhood of Geh-kong were first drained, and a commercial city founded there.

After the middle of the sixteenth century no mention whatever is made of Geh-kong, for at the time above named the city of Hai-teng was built upon its site, and the whole district was from that date known as Hai-têng, which name it bears to this day.

The great manufacture of this district in Marco Polo's time was silk, and Ibn Batuta is very truthful when he says, "In it they make the best flowered and coloured silks, as well as satins, which are therefore preferred to those made in other places." Local histories inform us that Changchow did for a long time excel the cities of Hangchow and Soochow in its silk manufactures, but its great speciality was a kind of embroidered velvet, and this, no doubt, is what our traveller

alluded to when, speaking of Zaitun, he said, "In it are many artificers in embroidered and arras work."

Silk manufactories still exist in the city of Changchow, but, owing to the devastations committed by the Taiping rebels there in 1864, this branch of industry is nearly stamped out. I saw, whilst visiting the city last year, a few looms still working, but I question very much whether this manufacture will ever again flourish there.

Tingiu, a place mentioned in the neighbourhood of Zayton as famous for its porcelain manufacture, next demands our attention.

This Tingiu is, I consider, the city of Tung-gan, locally called Tengwa, which is situated on another river to the northward of Amoy, and lies on the high-road between Choan-chin and Changchow, and must have been passed through by Marco Polo on his way from Kangu to Zayton. Much coarse porcelain (especially bowls) is made there, which finds its way to Singapore, Java, and other places in the Eastern Archipelago.

A few other notices of Zayton are to be met with in other mediæval travellers, but I will satisfy myself with a short notice of Maundeville's account of it.

As many are apt to look upon the travels of the good Knight of St. Alban's with a wary eye, I wish it fully to be understood that I am not anxious to enter the list and throw down the gauntlet to those who question our worthy knight's veracity; all I ask is that he may have fair play in regard to his account of Zayton, which contains facts that are wanting in the histories of other travellers. And I am prepared to prove that, if he really did not visit China himself, he must have had access to the notes of other travellers whose histories have not come down to us.

In speaking of Zayton, which, by some error in transcription, appears under the name of Latoryn, he says: "It is a day from the sea, and much larger than Paris. That in that city is a great river bearing ships, which go to all the coasts of the sea; for no city of the world is so well stored of ships." Further: "There are also in that country beasts taught by men to go into waters, rivers, and deep ponds, to take fish; which beast is little and called Loyres, and when men cast them into the water, anon they bring up great fishes, as many as men will."

This description of Zayton being upon a river, a day's distance from the sea, is very accurate. The main features of Maundeville's description of this city are so like those given by Odoric that they appear to have been copied.

Maundeville's description of the fishing cormorant is also to be met with in Odoric, but Maundeville tells us that men call these birds (beast he has it) Loyres. This is an important

addition to Odoric's version, for this word Loyre is, I consider, Mamdeville's manner of writing Lauwa, the name given to cormorants by the natives in the district where Zayton formerly stood.

Allowing for all errors of transcription, this seems to me a most interesting fact, and goes far to show that a valuable substratum of truth underlies the gross absurdities that abound throughout our worthy knight's book.

I will, in conclusion, make a few short remarks concerning Chincheo, which Colonel Yule identifies with the "old Zayton."

The learned commentator of Marco Polo is quite right in this assertion, but Chincheo represents the city of Chang-chow-foo, and not Chuai-chow-foo.

The derivation of the name Chincheo is thus given by Navarette, in his description of Chang-chow-foo: "This city, says he, is very famous in China. All the Chinese who trade with Manilla come from this district. On this account they are called Chin-cheos (and the town Chincheo and Chinchow) by the Spaniards."

Portuguese and Spaniards with whom I have conversed at Amoy, when speaking of Changchow, always called it Chincheo. In 'Kerr's Travels,' vol. vi. p. 382, we are informed—"That the Portuguese, on being driven from Liampo (Ningpo), obtained leave in 1547, by great presents, to settle in the province of Chincheo, in a village which began to flourish in consequence of a rich trade."

In the history of Changchow there are to be found scattered notices of the Portuguese resorting to this neighbourhood. Among other matters we find that, on being driven away from the Canton waters, they tried to carry on a trade in the Changchow prefecture, which they succeeded in doing by bribing the authorities.

The rendezvous of this trade was on the island of Wuseu, one of the six islands at the entrance of the harbour of Amoy.

In 1548, the existence of this trade coming to the ears of the viceroy of the province, orders were given to attack and drive away the Portuguese vessels anchored at Wuseu, and Chinese merchants and others who had dared to trade with them were, to the number of ninety, cruelly put to death.

It does not come within the province of this paper to accompany Marco Polo further than his port of embarkation, Zayton, but one could easily do so, and find many new and interesting coincidences in the works of mediæval Chinese navigators, wherein are described every country mentioned by Marco Polo, from Zayton to Ormus, in the Persian Gulf, in the same order, and in almost our traveller's own words.

From this fact I am inclined to consider that Marco Polo, when dictating his book, did, in the description of these particular places in question, now and again refresh his memory from some Chinese geographical treatise; and, if such were the case, Chinese will have to be numbered among his linguistic acquirements. I would, in conclusion, be allowed to state that I consider that a careful study of the works of Chinese geographers will throw great light upon many curious passages met with in the works of mediæval travellers: one example alone will be sufficient for our purpose.

It will be remembered by those acquainted with the works of travellers to the East in the Middle Ages, that the Pole-star is spoken of as being so many cubits, and, by Friar JORDANUS, as so many digits high. Now, this expression is purely a Chinese one, and I have in my possession a set of Chinese maps, published, I believe, in the tenth century, in which the latitude of places in India indicated thereon is shown by the number of digits that the Pole-star appears to be above the horizon.

Remarks on Mr. Phillips's Paper. By Colonel HENRY
YULE, C.B.

As Mr. Phillips's Paper will appear in the 'Journal' of the Society, it seems desirable not to let it pass without reply, though I am afraid the reply will occupy more space than the subject may seem to deserve. Mr. Phillips is wrong in calling me an Oriental scholar; it is a character to which I have no pretension, and which I have expressly disclaimed in the preface of the book to which he refers. But, at the same time, Mr. Phillips does surely misapprehend the amount of care and labour which were expended in arriving at the conclusions expressed in that book, when he judges that they can be so lightly upset.

It may seem presumptuous to reject a correction by a gentleman who is acquainted both with Chinese language and with Chinese topography. And it may easily be imagined by those who do not care to enter into such matters as are under discussion, that as with the Abbé Vertôt, my conclusions are published, and I will not have them disturbed. This would be a mistake, however, for "*mon siège*" is under revision for a second edition, and sundry corrections received from Mr. Ney Elias, the Baron von Richthofen, Mr. Wylie, and others, have been gratefully welcomed and adopted. I cannot, however, adopt Mr. Phillips's views except in one point. I see strong reason to believe that he is right in judging the Chincheo of the old Portuguese navigators to mean *Changchau*, and not *T'swanchau* (or *Thsiuanchéou*)

as the French write it). We shall recur to this point, which is worth settling; but it has nothing to do with Marco Polo, who claims our first attention.

The identifications of which Mr. Phillips treats are, in great measure, interdependent. Let us take FUCHAU first.

Marco Polo's Itinerary from Hangchau (his Kinsay) to the coast of Fokien, after crossing the frontier of that province, which he calls the kingdom of *Fuju*, or the kingdom of *Chonka*, reaches in three days the city of Kienningfu, which he calls *Quelinfu*, i. e. *Kelinfu*. "Quelinfu," says Mr. Phillips, "can, I think, without fear of contradiction, be identified with the present city of Kienningfu." What Mr. Phillips should have said was, "More than two hundred years ago Padre Martini showed that Quelinfu must be Kienningfu, and nobody has ever doubted it."

From Kelinfu Polo arrives in three days at a city which all the MSS. of the slightest value call *Fugiu* or *Fugui*, i. e. in English spelling *Foojoo* or *Fuju*. Ramusio's printed text alone, of which the original has never been found, has *Cangiu*, or rather *Cāgiu*. Let us stick to *Fuju* for the present, and see what rational interpretation can be put on it.

The city which then was, and still is, called Fuchau has certainly the first claim, as the names are identical.* That is one point to score.

The next question is, could Marco Polo have reached Fuchau in three days from Kienningfu?

Mr. Phillips, indeed, has no right to ask this, because he makes Marco Polo go twice as far in the three days.

If the road lies near the river, as is probable, the distance will be about 90 miles. Thirty miles, besides winding, makes a long march for Marco Polo, whose journeys, under ordinary circumstances, are somewhat short, as Baron Richthofen, after treading many hundred miles in his footsteps, has observed. But it so happens that on this particular occasion he has indicated 30 miles as the estimate of his day's journey; for he speaks of a place that was two days and 15 miles from Kelinfu, and 15 miles from *Fuju*. Therefore Fuchau *could* be reached by him in three days from Kienningfu.

Again: In chapter lxxx.† Polo speaks of the city of *Fuju* as the capital of the kingdom of *Fuju*. In the next chapter this kingdom (or province) is called *Chonka*, and it is said, "*Fuju* is the key of the kingdom of *Chonka*, which is one of the nine

* The termination *chau*, *chow*, *tchéu*, or *tchéou*, as it is variously written by modern Europeans, is almost invariably represented by *giu* in Marco Polo. Hence *Fugiu* is precisely Fuchau, or, as Mr. Phillips writes it, *Fouchow*.

† Vol. ii. pp. 179, 180.

great divisions of Manzi; . . . and a large garrison is maintained there to keep the kingdom in peace and subjection. For the city is one which is apt to revolt on very slight provocation." The last is a characteristic, I believe, of Fuchau to this day. But let that pass.

Now, Mr. Phillips says, "Fouchow (Fuchau) was not the capital of the kingdom in Marco Polo's time."

I feel disposed to answer, "Anyhow, Marco Polo says it was!" But I suppose Mr. Phillips will not accept that. Let us turn to Rashîduddin, the great minister and historian of the Mongol dynasty in Persia. In his short account of the twelve provincial administrations of Cathay, the seventh is—"Fúchú (or Fújú). This is a city of Manzi. The *sing* (provincial administration) was formerly located at Zaitún, but afterwards established here, where it still remains. Zaitún is a great shipping port, and the commandant there is Bohá-uddin Kandári."*

For Chinese authority I must go to Pauthier. In his list of the twelve *sings* under the Mongols, Fokien does not appear at all. But this is explained by what follows. Pauthier quotes from the *Yuen-ssé*, or official history of the Yuen or Mongol dynasty, that under them Fuchau "was the chief place of the circuit so called—viz., Fuchau-lu, established in (1278). Three years later (in 1281) the seat of the government of the *province* was transferred from Tshiuanchéou (T'swanchau), where it was, to Fuchau; in the next year (1282) it was removed back to T'swanchau; and in 1283 it was again recalled to Fuchau. Finally (in 1285) this government was united to that which had its seat at Hangchau, viz., Kiang-ché." The last clause accounts for its non-appearance among the twelve *sings*. Polo, no doubt, had first known the province when it was separate, and governed from Fuchau.

Thus the Yuen annals, the Persian historian, and Marco Polo, all agree in saying that Fuchau *was* the capital of the kingdom, and we therefore must reject Mr. Phillips's criterion.

Polo says further:—"There flows through the middle of the city a great river, which is about a mile in width, and many ships are built at the city which are launched upon this river."

Fuchau, strictly speaking, stands on the north bank of the Min, as London stands on the north bank of the Thames. But, as Mr. Phillips notices, a fine bridge connects Fuchau with its southern suburb, just as many fine bridges connect London with Southwark. Yet Polo himself when proceeding says, "When you quit Fúju and cross the river . . ." Fortune

* 'Cathay, and the Way Thither,' p. 268.

notices the great amount of ship-building at Fuchau, for which the pine-wood floated down the river affords facilities.

Again: "Enormous quantities of sugar are made there." Padre Martini says of Fuchau, "There is made in the district belonging to this city a huge quantity of very white sugar, and it is the first city in the eastern provinces of which this can be said."

Further, Polo says of Fujū: "Many ships of India come to these parts, bringing many merchants who traffic about the isles of the Indies. For this city is, you see, in the vicinity of the ocean port of Zayton, which is greatly frequented by the ships of India with their various cargoes of merchandise; and from Zayton the vessels pass on to the city of Fujū by the river I have told you of; and 'tis in this way that the precious wares of India come hither."

Martini observes that there was access in his time for the great Chinese junks right up to the walls of Fuchau.

Mr. Phillips asserts that "ships from India did not frequent Fuchau in Marco Polo's time, nor was there ever any foreign trade carried on there till the commencement of the 18th century."

Here, again, I might say: "We have already proved that Fujū was Fuchau (*i.e.* that Fuchau was Fuchau!), and we must be content to put Marco Polo's evidence against Mr. Phillips's." I have, indeed, no other *evidence* to adduce of the foreign trade of Fuchau in the 13th century; neither, indeed, has Mr. Phillips adduced any against it. But the capacity for trade was there, in a large city, the heart of a fertile district, with a fine navigable river, and apparently Western Asiatics at the head of the provincial administration; and the negative evidence would need to be strong.* But we see at the same time that Fujū, as regards Indian trade, is only represented as subordinate to the great ocean port, Zayton. The ships came from India to Zayton, and then they, or some of them, go on to Fujū, probably to take in that sugar which got in India the still prevalent name of *Chini*. It is possible that Mr. Phillips is misled by the notion of "foreign trade." It is evident from Ibn Batuta that the trade with India was chiefly carried on by Chinese junks and Chinese merchants.

* Since this has been in type, I have seen, through a correspondent in China, Mr. Phillips's original papers on this subject in the "Chinese Recorder." And I gather from these that the core of the negative evidence is the absence of any appointment of a collector of customs at Fuchau in the age with which we have to do. But, according to Polo's account of the secondary part played by Fuchau, one can readily understand that all such payments might be acquitted at Zayton.

Not only in name, then, but in everything else, may Fuju and Fuchau be identified.

Now as regards ZAYTON.

This was 5 days' journey south-east from Fuju. Polo's bearings cannot be taken strictly, for his reckonings are always on long traverses, and his whole journey from Peking to Zayton is stated as bearing south-east.

Now, we shall first show reason why T'swanchau is Zayton.

(1.) The distance as the crow flies from Fuchau to T'swanchau is about 115 miles. Add one-third for road-distance, it will be 153 miles, giving about 30 miles a day. Martini says the distance was just about 5 days' journey. I have no actual itinerary.

(2.) Zayton, according to Polo, was under the Government of Fuju. We have seen that Fuchau was the head of the province; but as this statement about Zayton would apply to every city in Fokien, this is no argument for one or another in particular.

(3.) Zayton, it is admitted, was the great harbour and focus of Indian trade.

Now, T'swanchau was the great focus and harbour of Indian trade.

It was the habitual port of arrival of ships from Ma'bar or Coromandel (*Pauthier*, p. 604).

It is mentioned by Matwanlin, "the Chinese Pliny," as the port of departure for Cochin China and Java (*Id.* 559).

In 1370 a mission sails from T'swanchau for Borneo (*Id.* 653).

In 1282 envoys arrived from sundry kings of India, including one from Kulang, *i. e.* Coilom of Polo, or Quilon (*Gaubil*, p. 196).

In 1286 vessels arrived at T'swanchau from more than 90 foreign states, the names of several of which that are given belong to Southern and Western India (*Gaubil*, 206).

In the Yuen annals the distances to the kingdoms of Southern India are estimated from T'swanchau (*Pauthier*, 603, 643).

In 1281 envoys sent to Quilon embarked at T'swanchau (*Id.* 603).

Deguignes says, I presume on sufficient Chinese authority, that Kublai's expedition against Japan started from T'swanchau. Polo says that the expedition was fitted out at Kinsay (Hang-chau) and Zayton.

The expedition against Java was fitted out from T'swanchau (*Gaubil*, 217; *Pauthier*, 570). This was just after Polo's departure. But he mentions the great profits drawn from Java trade by the merchants of Zayton (ii. p. 217).

(4.) T'swanchau was the chief port of foreign commerce in Fokien.

In Pauthier's treasury of valuable quotations, again, we find Kublai issuing customs regulations in 1293, in which are named, as the seven ports of foreign commerce—T'swanchau, Shanghai, Kan'pu (in Hangchau River estuary), Wenchau, Canton, Hangchau, and Kling-yuen (*i. e.* Ningpo).

Can anyone who has read of Zayton believe that it would be omitted from such a list? But if T'swanchau be not Zayton, then Zayton is omitted.

(5.) It was T'swanchau, as we have seen above from the Yuen annals, that had alternated with Fuchau as the seat of provincial government.

It was Zayton, as we have seen from Rashid, that alternated with Fuchau as the seat of provincial government.

(6.) Abulfeda says that the Chinese name of Zayton was *Shanju*. This I take to represent T'swanchau, but, as it might also represent *Changchau*, I will not lay stress on it.

(7.) The origin of the name of Zayton or Zaitún, from an old name of T'swanchau, *Tsétung* or *Tseu-tung*, which Klaproth quotes from the 'Imperial Geography,' is at least fairly probable.

We may more briefly show reason why neither Changchau nor Geh-kong is Zayton:—

(1.) Because these towns are a great deal more than 5 days' journey from Fuchau, which we have shown to be Fuju.

(2.) Because neither of these towns was ever in the time of the Mongols chief city of the province of Fokien.

(3.) Because neither of these towns is mentioned among the seven great ports of foreign trade in Kublai's customs regulations of 1293.

(4.) Because neither of them is mentioned as a port of trade with India, or otherwise, in the numerous translated passages from the Mongol annals given by Pauthier; nor in Gaubil's 'History of the Dynasty;' nor in Rashiduddin's account of Cathay, so far as it is translated or published.

And T'swanchau being Zayton it cannot be Fuju, or Cāgiu as Ramusio has it. If Cangiu were the right reading, still *Canju* is not particularly suggestive of T'swanchau. The probability is that *Cāgiu* is a mere clerical error for *Fugiu*. Even in Ramusio the city is called *Fugiu* in a previous chapter.

I cannot admit, then, that Mr. Phillips has had any solid justification for his endeavour to disturb the identifications of Fuju and Zayton hitherto accepted. He has jumped to his own conclusions over several of the most essential facts: for all these passages that I have quoted were open to him, but he has taken no notice of them.*

* I find that Mr. Phillips has quoted several of these passages in the 'Chinese Recorder;' but they do not seem to have made their just impression on him.

There exists a stronger argument than any that Mr. Phillips has produced, for Zayton being *Changchau*; though it loses all real force after the grounds for identifying Zayton with *T'swanchau* have been fully stated. This is the circumstance that the Jesuit missionaries of the seventeenth century found at Changchau a variety of Christian sculptures, such as images of the Virgin and marble crosses, and also a medieval Latin Bible. This is remarkable, because Zayton, some years after Marco Polo had left China, became the seat of a Catholic bishopric and of several Franciscan convents.* Indeed, the worthy Padre Martini, who tells us about the Christian relics found at Changchau, is evidently perplexed between its claims and those of T'swanchau to represent Zayton, and appears to give a somewhat impossible verdict in favour of both cities!

Mr. Phillips does not seem to have realized what is meant by the existence of various readings of names in the medieval authors to whom he refers, such (*e.g.*) as *Cayton*, *Carcam*, *Sarcam*, *Tarcam*, for "Zayton." He cannot surely think that the travellers put down all these forms to accommodate their readers in after generations with a choice, and that he, as a reader, may adopt any one of them that suits his fancy without reference to the evidence for the correct reading, or that he may adopt now one and now another? But yet he acts as if he thought so. It is as if we found in five various copies of a medieval Italian manuscript that the great city and port of England was called Lundun, Loudou, Lordor, 'loundou, Dundu; and an Italian who had been in England should say, "People fancy Lundun means London; but this is very inaccurate. I have been over the ground, and I am in favour of the reading Dundũ. This Dundũ I identify with Dundee."

Now there is no more real doubt about *Zayton* (or *Qaiton*) being the correct form, than there would be in the imagined case about *Lundun* or *London* being the correct reading. And I will add, that I at least do not feel more real doubt that *Zayton*, the great Indian port of the Yuen, was T'swanchau, than there would be doubt in the imagined case that the great city intended by the Italian's various readings was London.

I admit that the aspect of the magnificent estuary now called Amoy Harbour, answers better to the strong language of medieval travellers regarding Zayton—*e.g.* of Ibn Batuta, when he calls it the greatest harbour in the world—than anything we know of the harbour of T'swanchau in these days. But this will not stand in the face of positive proof such as has been adduced on the other side. All the rivers of that coast, as I learn

* And Mr. Phillips has referred also to this matter in the 'Chinese Recorder.'

from a valuable letter just received,* are rapidly silting up; and probably the deterioration of T'swanchau began long ago, and sent the foreign trade to T'sangchau, as the deterioration of Changchau has sent it down to Amoy. Yet even in the seventeenth century, *teste Martinio*, the largest ships (junks no doubt) could anchor beneath the walls of T'swanchau.

Mr. Phillips is hasty, again, when he attributes value to Sir John Maundeville's chapters about Cathay, and says "he is prepared to prove that, if Sir John really did not visit China himself, he must have had access to the notes of other travellers whose histories have not come down to us." I went into this matter some years ago very carefully, and the conclusion comes thus expressed in these words: "The substance of his travels to the Indies and Cathay is entirely stolen from Odoric, though largely amplified with fables from Pliny and other ancients, as well as from his own imagination, and garnished with his own wonderfully clear astronomical notions."† The account of the fishing cormorants under the disguise of *beasts* is taken from one version of Odoric's 'Travels,' corrupted probably by the conceit of the scribe who did not believe about the birds. This may be seen in 'Cathay,' p. 112, *note*. The scribe there converts the cormorant into a *sea-calf* or seal. Maundeville has taken another view. The little beast called *Loyre*, is meant for the beast modern French calls *Loutre*, *i.e.* an otter. A reference to Littré's great Dictionary will show that in Provençal the word took the forms *Luria*, *Loiria*, so that probably *Loyres* is not even a clerical error for *Loutres*, as it might be. So we must acquit Sir John of knowing the Fokien dialect.‡

I will conclude with a few words about the application of the name *Chincheo*. In our maps and sea charts, *Chincheo*, or *Chinchew*, is applied to T'swanchau; and I never doubted, till I read Mr. Phillips's paper, that the *Chincheo* of the old Portuguese writers was the same. But his remarks have induced me to turn to such references as are accessible to me; and though these are not enough for the thorough understanding of the matter, I am happy to be able to say that, so far as they go, they entirely corroborate Mr. Phillips's statement that *Chincheo* really meant *Changchau*.

Thus in Astley's 'Voyages,' vol. iv., plate 10, is 'A Chart of

* From the Rev. Carstairs Douglas, LL.D., of Amoy, who himself favours Mr. Phillips's view.

† 'Cathay,' &c., p. 27.

‡ I may add, that I have seen "the little beasts called *Loyres*" employed by fishermen in the Ganges Delta. Bishop Heber describes the same, vol. i. p. 81, edition of 1844.

the Bay of Chinchew or Changchew, in China, from Montanus.' This is, in fact, a chart of Amoy Harbour. The river, entering the harbour on the western side, *i.e.* the Chang River, coming from Changchau, is marked 'R. Chinchew;' and an eminence at the south-west point of the bay, called in the modern Admiralty chart Chinha Point, is marked 'Chinchew Hill.' T'swanchau does not come within the chart; the editors of A. 'ley call it *Suenchew* and *Tswenchew*.

In the 'Arcano del Mare,' by Sir Robert Dudley (by creation of the Emperor, "Duke of Northumberland"), published at Florence in 1647, there is a chart of the Chinese coast, in which also Chincheo occupies the position of Changchau. There is no place on this chart that I can *certainly* identify as intended for T'swanchau; but a place marked *Suadechijo*, on the north side of Amoy Harbour, is, I fancy, intended for it. The text of this work (vol. i. book ii. p. 43) says: "At the most easterly cape of the Gulf of Canton, in lat. $22^{\circ} 40'$, you should keep 5 leagues to sea, towards the south-east, to avoid certain little islands and rocks on the coast; and then running north-east by east (*seguitando il vento Greco verso levante*) you will find the harbour and beautiful city of Chincheo, in China, in lat. $24^{\circ} 15'$. This is a place of trade, and a charming place; there is especially a great trade with the city and port of Manilla." This must, I think, be Changchau, the latitude of which is about $24^{\circ} 28'$; whilst that of T'swanchau is close upon 25° .*

In Linschoten's 'Grand Routier de Mer,' also, I have tried to follow his sailing directions (chap. xxx.) from the Canton River to Liampo (*i.e.* Ningpo), and though this is not an easy matter, I am satisfied that his *Havre de Chinchon* (as it is printed) is Changchau, or rather Amoy, Harbour. Also in the rude 'Map of the Sea Coast of China,' &c., in the book of Captain Alexander Hamilton, *Chinchew* manifestly represents Changchau.

It is a curious question, then, how *Chinchew* came to be applied by our navigators to T'swanchau; or, if (as is possible) that was the original application, how it came to be transferred to Changchau; and I suppose the examination of a series of charts of the last two centuries might throw light upon it, but I have no access to such a thing where this is written. Perhaps Admiral Collinson, who has mapped the approach to Chwanchau as Chinchew, will try to solve the question.

It is to be regretted that Mr. Phillips has not given us some

* In Dudley's map, the latitude is much further from the truth. I have attached to these notes a rough reduction of Dudley's chart placed alongside of a modern outline of the coast.

translation from those mediæval works of Chinese navigators to which he refers in the latter part of his paper.

H. YULE.

NOTE.—After this was in proof, I received from Dr C Douglas further notes, ably supporting the substance of Mr Phillips's views, and which have modified mine, not about Fuchau, but about Zayton, so far that I admit the likelihood that Amoy Harbour may have been embraced by the terms *Port of Zayton* or *Port of T'swanchau*, though the Zayton city of Polo I must continue to regard as T'swauchatu.

Palermo, February 22, 1874.

Notes on the Identity of Zayton. By the Rev. CARSTAIRS DOUGLAS, LL.D., of Amoy.*

THE rival claims of Chang-chau and T'swan-chau to represent Zayton, supply a good example of a question where much can be said on each side, and where, indeed, on *each* side there are some points very difficult to explain away. To me the balance seems decidedly in favour of Chang-chau, or rather of Chang-chau city, along with some port or ports near Haiteng or Chuoh-bey. But this solution is not complete without the additional position, that from a very early date the cities of Chang-chau and T'swan-chau had been confused by merchants and travellers. It is now established beyond question that the Portuguese "Chin-cheo" is not T'swan-chau but Chang-chau; though, in recent times, the name "Chin-chau" or "Chin-chew" has become the regular foreign name of T'swan-chau, Chwan-chau, or T'sien-chau. Now, as this confusion has unquestionably prevailed for several centuries, may not a similar cause have produced a similar confusion in the time of Zayton's glory? It might thus well happen that authorities which *seem* to be on the side of T'swan-chau, are really for Chang-chau. In a similar way it is not at all improbable that, after the lapse of centuries, the first edition of Colonel Yule's 'Marco Polo' may be quoted as proving that Zayton is Chang-chau; for he identifies Zayton with the Portuguese "Chin-cheo," which is unquestionably Chang-chau, as nearly as possible.—Q. E. D. Also the view which Colonel Yule gives of the harbour of Zayton is really a view of the mouth of the *Chang-chau* River. Doubtless Captain

* N.B.—It ought to be said that Dr. Douglas gave no authority to print these notes, but I feel confident that he will not object to my doing so, and they ought to be printed in this volume, because they do more justice to Mr. Phillips's thesis, perhaps, than his own paper does. What further I have to say on the subject will be said in the second edition of 'Marco Polo,' about to issue; it is undesirable to prolong the discussion here.—H. Y.

(now, I think, Admiral) Stoddart had been misled by the usual confusion between Chin-chew and Chin-cheo.*

But there are two other powerful causes tending to produce the confusion, namely: (1) The islands of Amoy and Quemoy belong to T'swan-chau; and (2) The harbour of Amoy, &c., serves to a large extent as the harbour of T'swan-chau.

The islands of Amoy and Quemoy, which lie at the mouth of the Chang-chau River, belong, and always have belonged, to T'swan-chau. Indeed, Aw-su-kio, on the north shore of the Chang-chau River, just opposite Hai-tong and Chieh-bey, belongs, and has always belonged, to T'swan-chau.

The channels, creeks, and bays, about the islands of Amoy and Quemoy (forming, as a whole, one of the best harbours in the world) are used, and must always have been used, as a harbour for T'swan-chau as well as for Chang-chau. At present a great part of the trade of T'swan-chau is carried on through Amoy, partly by junks touching here on the way, or transhipping their freight into smaller junks, partly by the shorter sea-passage to An-hai, which was in ancient time an important city, and which still has a magnificent bridge a mile and a quarter long. It is true that the *town* of Amoy does not appear to have been famous in ancient times; but the *harbour* must always have been the same: and, on the other hand, the harbour of Chin-chew must always have been inferior, because the channels at the mouth are narrow and rocky. At an earlier date Chang-chau itself, with all the neighbouring country, belonged to the Department (Chau) of T'swan-chau. At that time Chang-chau was not the chief city of a Chau or Department, but was merely a Hien or District, named Liong-khe. It is, therefore, quite probable that even after Chang-chau became the chief city of a Department, the management of trade on the sea-board may have remained with the T'swan-chau authorities. It is quite common in China to have such overlapping of the boundaries, *e. g.* of the civil and military officials, or of the civil government and the customs' service.

Such considerations seem very much to weaken the argument for identifying Zayton with T'swan-chau, because T'swan-chau is always spoken of as the great foreign port of Fuhkien. My

* This is a fair hit: for Dr. Douglas is, I find, quite right as to the fact; but there was no error on the part of Admiral Stoddart, who has now been consulted. Some of Admiral Stoddart's sketches were made use of by Fisher, Son, and Co., in their 'China Illustrated,' published some 30 years ago. One of these was a view from the island at the mouth of *Changchau River* (vol. iv. p. 48). But Fisher's editor converted this into 'Entrance to the *Chincheu River*,' and, to bar all doubt, identified that, in his text, with the river of "*Tsuen-tcheou-foo*." And I adopted this for 'Marco Polo,' trusting to the name of the sketcher, on the plate for its genuine character.—H. Y.

explanation would be that the "Ocean port of Zayton" was so intimately related to T'swan-chau, that the two were spoken of as one.

In the same manner, expeditions really starting from Amoy harbour might most properly be said to go from T'swan-chau, as Amoy itself is in the Department of T'swan-chau, and such a phrase as "*T'swan-chau*," in Chinese, bears *equally* the meanings of the chief city or *any part* of the Department governed by it. Thus, by the existing Treaty, the ports of Chau-chau-foo, Teng-chau-foo and Tai-wan-foo are opened to trade, while the actual ports for the first two are Swatow and Chefoo; and Tai-wan again covers not only its own roadstead, but also the subsidiary ports of Ta-ka-o, Tam-say, and Ke-lung. Still more analogous is the case of New-chwang. That city lies some twenty miles up the Liao River, while the very *name* of New-chwang is regularly applied by foreigners to the port of Ying-tse, at the mouth of the river, where foreign trade is carried on.

As regards the expeditions from Zayton, cited as from T'swan-chau, it seems to me very improbable that, with such a magnificent haven as Amoy close at hand, the authorities of the province would have collected vast armaments in the inconvenient harbour of T'swan-chau. I suppose that an expedition which sailed from the Mutlah might well enough be said to be sent from Calcutta.

The close relation which Marco Polo indicates between "Fuju" and the "Ocean port of Zayton," thus suits admirably for T'swan-chau and some port in the neighbourhood of Amoy. But the distance between Fuh-chau and T'swan-chau, with other circumstances about the nature of the harbours and the intervening coast, make such a relation very unsuitable and unlikely between them.

Marco Polo seems to distinguish clearly between the *city* of Zayton and the haven or ocean port of Zayton. The total absence of all notice of foreign trade at Fuh-chau, in the Mongol period, seems to destroy the possibility of its being the "Fuju" of Marco Polo. Its omission in the lists of foreign trading-ports in Colonel Yule's criticism on Mr. Phillips's paper, seems incompatible with Marco Polo's glowing description of its foreign trade. For though T'swan-chau and a port near Amoy might very well be counted as *one*, such an explanation cannot serve for two ports so far separate as Fuh-chau and T'swan-chau.

Again, the statement that Fuju is the capital and the key of the kingdom or province of Fuh-kien, will not suit for Fuh-chau; for the very authorities quoted by Colonel Yule prove that, during the time Marco Polo was in China, Fuh-chau was the capital *only for three years*, while T'swan-chau had been the

capital from time immemorial, and in the latter part of the time *neither* was the capital. It is a mere "petitio principii" to say "Marco Polo says it was;" for the very question at issue is, what city does he designate by Fuju? The name is, doubtless, a very strong argument on the other side; but it is not safe to *depend* on that—*e. g.* Ma'abar and Malabar, or the two Babylons. Possibly Marco may have confused the names of the two cities, or T'swan-chau may have sometimes been named "Fuh;" for it is common in China to speak of the capital of a province, and the province was then, as now, named Fuh-kien. There is also one part of the description of Fuju which does not suit Fuh-chau. The river does not flow through the middle of ~~that~~ city, and in all probability never did. The River Min is now about three miles from the city, and the noble bridge proves that it ~~was~~ always there in the same channel, since the Sung dynasty at least. There is, indeed, a large suburb, but it is on the north side of the river, connected with the city by a straggling street; there is scarcely anything on the south side except the foreign houses and hong's, and their appendages. But the description of the river flowing through the city applies to T'swan-chau even now. The river flows within a few hundred yards of the walls, and the intermediate space is occupied by a dense suburb, running about a mile and a half along the banks; and even now there is a very considerable suburb on the south side. When the city was the capital of the province, this suburb, doubtless, was much larger, and the description would be extremely accurate.

I need not dwell on the Christian remains, admitted on all hands to be a strong argument for Chang-chau. But I may remark, that though I have been scores of times at T'swan-chau, I never heard of the slightest trace or tradition of Christianity: nor even now are there any Roman Catholics within forty miles of T'swan-chau.*

The statement of Rashiduddin, that Zayton alternated with Fuh-chau as the capital of the province, seems at first sight to fix T'swan-chau as Zayton: but he may, like other people, have confused the Chang-chau and T'swan-chau. And, *certainly*, his information about Zayton was extremely inaccurate, as he places it at the end of the Great Canal. (Yule's 'Marco Polo,' ii. 137.) So that his testimony is not very formidable.

But to return to Chang-chau; the notice of Ibn Batuta's journey from Zayton to Canton and back, both times *by the river*, is sufficient of itself to settle the question: for that is a common route between Chang-chau and Canton, all by river,

* Martini's Atlas shows Roman Catholic churches in and near T'swan-chau-Fu, none in Chang-chau-Fu (circa 1650).—H. Y.

with the exception of some short portages. But no one could possibly go by river to or from T'swan-chau, for there is no river communication. Again, when Ibn Batuta goes on from Zayton towards Hang-chau, he still travels by the river, a most natural thing if Zayton be Chang-chau, as the North River gives an excellent route (with but short portages) to the centre of the province, en route for Hang-chau, with a choice of roads afterwards. This will suit whatever "Kan-ján-fu," or "Fan-jan-fu" may be: whether it be Fuh-chau, or Kien-ning-foo, or some place in Kiangsi, the North River would equally give a good route from Chang-chau. But no one going from T'swan-chau to Hang-chau *could* travel by river, whatever route he might take.

The Arabic expression of the Chinese name of Zayton, namely Shan-ju, or Shangiou, or Shengiu, is a very strong argument for Chang-chau. For, both in Mandarin and in the local vernacular, the name of T'swan-chau begins with TS; the spelling with Ch is an English blunder; the sound of TS is unmistakable, and that is a sound quite familiar to Arabs and easily expressed by their alphabet: on the other hand, the Ch of Chang-chau (exactly the same as the English Ch) would perplex them, and be naturally expressed by Sh. We have, therefore, the distinct contemporaneous statement that Zayton is Chang-chau. The silk-manufacture of Chang-chau is also a strong argument. Just as Zayton gave the name to Satin, so at present there is a sort of silk-stuff *named* from Chang-chau.

The derivation of the *name* Zayton is very uncertain. The idea of its derivation from "Tseu-thung" is a pure myth. T'swan-chau was *never* named "Tseu-thung," any more than Calcutta is named "Palaces," or New York named "Empire." It was, indeed, designated "Thung-ching" or "Tseu-thung-ching," but never without "ching," *i. e.* "city," that is, "the city of thung trees," but that, not as a name used in speaking of it, but as an elegant designation in polite literary composition; just as Chang-chau is the "City of Banians" and Canton the "City of Rams." I cannot speak with quite so much confidence about the hypothesis that "The City of Olives" is a *translation* of "Thung-ching;" but this also is very improbable, for the "Tseu-thung" or "prickly Thung," which the Chinese say was planted round the walls, is not the species of Thung from which oil is made.

If Zaitun be a *translation*, it is a strong argument for Chang-chau: for there is a tree which abounds in the mountains of Chang-chau, a sort of *Canarium*, called by the Chinese "Kam-lam," the fruit of which is so like an olive that foreigners all call it the "olive." The Chinese eat it pickled as a condiment, much like olives. At present this tree is found in great abundance among the mountains, and but rarely near the river;

but there are proofs, in the names of places, that it was formerly abundant where it is now less common; and even now the stalls in the streets of every town and village, and at every wayside rest, are full of these pickled "olives." What more likely than that, as we now call this *Canarium* the "olive," the Arabs had done the same, and called it the "City of Olives"? But in T'swan-chau, even in the mountains, the tree is not found.

If it be, on the other hand, an imitation of the *sound* of a name, perhaps Hai-teng is the most likely. It was not indeed till the Mong' dynasty that the district (Hien) of that name was erected out of parts of three old districts; but the name might well have been in use long before the district was removed from it. But all these suggestions about the *name* Zayton are made as simple conjectures. That from the *Canarium* seems the most likely.

In Marco Polo's description of "Fuju," the ship-building suits about equally for either. The tendency to sudden disturbances or commotions cannot be used as the *differentia* of either city. The sugar suits *better* for T'swan-chau than Fuh-chau.

The more I consider the very strong language about the extraordinary excellence of the haven and harbour, the more it appears that T'swan-chau does not suit; for it would be a sad case for the commerce of the world if there were not abundance of harbours incomparably better than T'swan-chau can ever have been; while really few can be found to equal the noble estuary which forms the outer harbour of Amoy, where the whole navies of several kingdoms might anchor in safety.

I trust that I have shown sufficient reason, if not to substantiate the claims of Chang-chau and its ports, at least to support Martini in his double verdict for both; yet with the balance in favour of Chang-chau.

There is abundant evidence to prove that Chang-chau rose to great importance in and near the Mongol period. Formerly the city now named Chang-chew was named Liong-khe (Mandarin "*Lung-ki*,") the "Dragon River," while the name of Chang-chau belonged to the city of Chang-poo, which was then the capital of the Chau or Department. Originally Liong-khe belonged to the department of T'swan-chau; but in 731 Liong-khe was transferred from T'swan-chau to Chang-chau, *i. e.* placed under Chang-poo. About 790 the name of the city was changed from Liong-khe to Chang-chau, as it was then made the capital of the Department. I should hardly say changed, for Liong-khe is still the name of the city when viewed as a hien or district. Again in 1296 it was raised to be the capital of a *fo*,—a word sometimes used to mean a subdivision of a province, containing several Chau departments, somewhat like the "circuit" now governed by a Tau-tai; but

the word Loo sometimes seems to have a higher rank, almost like a province. A few years later we find officials at Chang-chau almost of the rank of the provincial authorities; for at the time of the downfall of the dynasty it was the residence of a Commander-in-Chief (Yuen-shwae). It is not, therefore, at all strange if a writer at a distance might have spoken of Chang-chau, under the name of Zayton, as the capital of a province.

About 1325 the region was so prosperous that a new district, Nan-tsing, was erected on the west of Chang-chau; and under the Ming dynasty the new district of Hai-teng was erected.

Chang-chau is now the seat of a Tau-tai, who governs about a quarter of the province. T'swan-chau is the seat of the General (Ti-tuh) who commands all the Chinese land-forces of the province. The city walls have a circuit of seven or eight miles, but a great deal of the interior is vacant ground. The mission of the English Presbyterian Church has had a chapel in the city for about ten years.

The city of Tswan-chau, when spoken of as a Hien district is called *Chin-kang*, which may perhaps be the original of Marco Polo's *Chon-ka* (for the syllable Chin is, in Cantonese, pronounced Tsun), and is probably the cause of the name *Chin-chew*, as used by foreigners. On the other hand, the people of T'swan-chau call Chang-chau "*Cheng-chau*," which would help to create the confusion of the names of the two cities.

VII.—*Notes of a Journey in Yemen.* By CHARLES MILLINGEN, M.D. Edinburgh.

[Read, February 23rd, 1874.]

I WILL first describe the route between al-Hudaidah and Sana'a, the immediate object of my tour, and will then dwell at somewhat greater length on the tract of country travelled over on the return journey from Sana'a to al-Hudaidah by way of Kaukabân, Tawilah, and the valley of the River Sardûd.

Starting from al-Hudaidah, we followed the usual caravan-route across the Tihâmah, passing the villages of Marâwah and Kuttây, and halting at Bâjil at the foot of the hills. The Tihâmah, or plain between al-Hudaidah and the hilly country, is about 30 miles in breadth: it is sandy, and slopes gradually toward the sea. The first half adjoining the coast is desert; the well-water is brackish, and the rainfall is scanty. The other half, however, from its vicinity to the mountains, participates in the frequent showers which fall on them throughout the year, and especially during the heavy summer rains. Hence cotton,

dhurrah, and millet are extensively cultivated, as well as indigo, *sálab* (a plant from the fibres of which are made the bags in which coffee is packed), and other useful plants in various parts of this portion of the plain. Date-trees abound in the neighbourhood of Zabíd. As a natural consequence, numerous villages are scattered all over the plain, and the markets, which are held on fixed days at the various hamlets, afford every facility for disposing of the produce of the land.

Bâjil, situated as it is at the entrance of the valley which is the highway to Sana'a, is a village of some importance, and is garrisoned by Turkish soldiers. Leaving Bâjil, one proceeds in an easterly direction to the village of Buháy, in a valley at the foot of Jâbal-Thamûr, and soon after enters the Wâdi-Sâham, bounded by Jâbal-Burûah on one side and by the Harâz mountains on the other. At Ubbâl the road takes a south-easterly direction, and, leaving Jâbal-Burûah, skirts the base of the Harâz mountains, along the left bank of the River Sâham as far as the village and military station of Sanfûr. Crossing the stream at this spot, one leaves it to enter a narrow gorge several miles in length, in which are the caravan-stations of Baitu'sh-Shaikh and Sâham. At length one leaves the gorges of the Jâbal-Harâz and comes to open country at Mifhâk, formerly an Arab shaikh's stronghold, but since 1871 a Turkish fortress. The castle is on a basaltic rock, 200 feet in height. Another route, shorter by six hours, is sometimes followed from Bâjil to Mifhâk; it branches off at the village of Buháy, and, after many ascents and descents, leads to the large village and military station of Munâkhah, in the Harâz district—Mifhâk being distant 18 miles from it. The road along the Wâdi-Sâham is preferred by most travellers, as being less mountainous. Camels laden with merchandise invariably take the Wâdi route; on arriving at Sanfûr, the camels of the Tihâmah are exchanged for those of the Jâbal, as the former, from their unwieldy proportions, are very liable to fall and sustain irreparable injury in the hilly country. The mountain camels are very different in appearance, and are light and surefooted. It is the same with the donkeys of the Tihâmah and those of the Jâbal.

From Bâjil to Mifhâk, which must be about 2000 feet above the level of the sea, one rises higher and higher, but almost imperceptibly. At Sâham and Mifhâk the temperature was most agreeable, the nights cool, and the mountain air bracing. The country is everywhere green, well wooded in some parts, the hill-sides covered with shrubs, and the mountains, even the highest, are clothed with coffee-trees, *Kât*, and cornfields. Acacia-trees of various species, tamarisk, tamarind, and many other trees, new to us, adorn the valleys. There are numerous

species of euphorbiacere and asclepias. A remarkable tree is the *Oleander obesum*, growing on the rocky hill-sides: its trunk is like a huge pear or turnip, from which issue branches as thick as a finger. The natives call it *Adánn* [which means a dwarfish plant], and ascribe poisonous properties to it. The flowers are smaller than the common oleander, of a rose colour, and possess a fragrant smell. In the Wádi-Sáham we saw a few screw-pines, *Pandanus odoratissimus*. The flowers are much prized by the Arabs, and they are in the habit of wearing them in the folds of their turbans, along with jessamine and other flowers.

A tree, called *Thalúj*, a species of *Ficus*, has large leathery leaves, and of all trees affords the most grateful shade. Between Sáham and Mifhák there is an enormous *Thalúj* tree, many hundred years old. On the road between these two villages there is a small coffee-plantation: they are the only coffee-trees that one sees between al-Hudaidah and Sana'a. Game, such as guinea-hens and red partridges, abound in the wooden ravines; bustards are rare. The red partridge, called *Kabj*, resembles the European red-legged partridge; it is, however, much larger, and the plumage is different. It is widely distributed throughout Yemen and the Hijáz. Gazelles and antelopes are scarce. As regards beasts of prey, such as leopards, hyenas, &c., we fancy that they have long since been exterminated: the country is everywhere cultivated, there are no forests, and man inhabits the most inaccessible mountains. Monkeys, the species of *Pithecus* found throughout Arabia, from al-Medīnah to Aden, we saw and heard at times in the Haráz mountains. Lizards, especially one of a dark-blue colour, often attracted our attention, but we never chanced to see a snake.

Leaving Mifhák one ascends a steep mountain, well cultivated with cereals, and after passing several villages one reaches the summit of the pass, about 6000 feet above the sea. A northerly wind was blowing and it was bitterly cold, and we much envied the sheep-skin coats which the peasants, whom we met, were wearing. Descending to Bua'an we crossed over a bridge, a stream flowing westward—according to Niebuhr, a tributary of the Sáham. We now travelled over level ground, halting at the village of Máthna, and, after a ride of 10 miles, descended about 1000 feet into the plain or valley of Sana'a. The country between Mifhák and Sana'a affords a contrast quite as striking as the Tihámah to the wooded valleys between Bájl and Mifhák. One sees nothing but bleak mountains, treeless plains, and black volcanic stones and scorice. The air is quite chilly at night, and the sun's heat by day is moderate. Cruttenden estimates the height of this plateau at 5000 feet. The land, however desolate the scenery may be, is well cultivated

with wheat, barley, beans, clover, and mustard—the oil expressed from the seeds of the latter being used for lighting purposes. On the sandstone and basaltic hills which border the plain are several villages: the houses, two and three storeys high, in the form of square towers, are built of hewn stone.

Sana'â lies in a valley at the foot of Jâbal-Najûm, and is bounded on the west by a range of sandstone hills, known as the Jumlân and 'Usâr mountains. The soil consists of sand and pebbles, with volcanic stones containing iron. The plain at Sana'â is about three miles in width, but toward the north it widens, while toward the south it rapidly contracts. A small stream runs northwards, but is entirely used up in watering the various orchards. Sana'â is a walled town, about two hours in circuit: it is divided into the Jewish quarter at the west end, Bîru-'l-'Adzb, and the city proper, with the citadel, at the east end. There are many handsome houses, but many quarters of the town are in ruins, and the population at the present time, including the Turkish garrison of 1000 men, is scarcely over 20,000.

Jâbal-Najûm consists of sandstone rocks, through which masses of basalt have been upheaved: in some parts they form large polygonal columns. Iron pyrites, and black stones containing iron, are very abundant. Many fine agates are found in the rocks. Gypsum, alabaster, and marble are found in the neighbouring hills. The salt used at Sana'â and the uplands of Yemen is rock-salt, which is brought chiefly from Mârib, in the Jauf country. This latter district also furnishes horses.

During three of the four days that we spent at Sana'â it rained incessantly, the temperature falling to 59° Fahr. Generally speaking, the climate of Sana'â is subject to great variations, cold nights succeeding upon hot days. Water freezes not unfrequently in winter, and the natives are obliged to use furs and sheepskins. The Turkish medical men who have resided some time at Sana'â, all agree in considering its climate as very trying, and positively unhealthy.

Sana'â has been so well described by Niebuhr, Cruttenden, Hulton, Seetzen, and other travellers, that it is superfluous to enter into details concerning it, and the more so, as with the exception of the presence of Turkish troops, I believe Sana'â is very much what it was a century ago; if anything, the town has fallen off, and the population has dwindled down considerably.

The distance from al-Hudaidah to Sana'â is about 130 miles.

- Until the Turkish troops occupy the Jauf and Najrân, travelling in those districts will be fraught with danger (witness Arnaud and Halwy's journeys); hence the ordinary traveller

must forego the pleasure of exploring regions so interesting from the numerous Himyaritic remains that they contain.

Leaving Sana'a, we determined to return to Hudaidah by way of Kaukabân, Tawilah, Jâbal, Hâfash, and Bâjil.

We first visited Raudhah, 5 miles to the north of Sana'a. Here are the summer-houses of the wealthier Sanâwis; going across the plain in a westerly direction, we saw in the distance the village of Jadr, and passing near other villages we reached the hills and entered the gorge of Wâdi-Thaur, in which is a walled town of the same name. Al-Wâdi is a narrow winding gorge, shut in by hills of sandstone of a reddish hue; its length must be about 10 miles. A considerable stream which has its source in Jâbal-Hâthûr, also called Jâbal Nâbi-Shâib, flows north-eastwards toward's the plain, watering several miles of orchards. The Wâdi-Thaur supplies Sana'a with fruit, such as grapes, figs, walnuts, peaches, plums, apricots, pears, apples, lemons, oranges, mulberries, and quinces. There are a few date-trees, but the dates do not ripen. Najrân sends dates to Sana'a. The natives are very proud of Wâdi-Thaur, and liken it to Damascus; it certainly is a fertile and beautiful valley with abundance of water.

From al-Wâdi we rode to Shibâm. Ascending the hills which border the valley on the west, we travelled for several hours over a stony plateau, cultivated partially with cereals. From the most elevated part of the table-land we had a good view looking west of a long range of cliffs running from north to south, and we could faintly discern on one cliff the town of Kaukabân. To the south was Jâbal Nâbi-Shâib, one of the highest mountains in Yemen (snow falling on it at times in winter. Descending we reached the plain, and at length the walled town of Shibâm at the foot of the cliffs on which is Kaukabân. To the north, on the heights of the sandstone range, is the fortress and village of Thâllah, and beyond it, on the plain, the village of 'Amrân. The plain of Shibâm is very fertile, cereals, clover, beans, and mustard being the chief products. There are a few willow-trees and fruit-trees near a spring outside the town. On the face of the cliff are numerous grottoes hewn in the rock; we also noticed many in the Wâdi-Thaur.

Some are inhabited, others being used for storing hay or as stables. It is impossible to say at what period these chambers were constructed, but it is probable that they date from the earliest times.

A causeway bordered with rose-bushes, ferns, nightshades, &c., leads up to the summit of the cliff, 800 feet above Shibâm. Beasts of burden ascend and descend with the greatest facility, so well has the road been made. It reminded us of the Arab

causeway leading to the peak of Jâbal-Shamsân, at Aden. Once at the top, one soon reaches the walls of Kaukabân. This famous Arab stronghold, which surrendered to the Turks in 1872, after a siege of seven months, is built on the edge of a sandstone plateau called Jâbal-Dhâla'. On two sides of the town are yawning precipices; at the bottom of one is Shibâm, and of the other a ravine, called Wâdi-Nâi, the third side of the triangle being formed by the table-land, the only vulnerable side. The view from the heights of Kaukabân comprises the plain of Shibâm, a portion of the plain of Sana'â, Jâbal-Najûm and in clear weather the minarets of Sana'â, distant 18 miles in a direct line; besides a wide table-land, the heights of Gunlan and Jâbal Nâbi-Shâib. Towards the south, far below, are the Harâz and several other mountains. Looking west one sees nothing but a stony table, and to the north are Jâbal-Mithnary, Thallah, and 'Amrân. The water supply of Kaukabân is inexhaustible, from the extensive reservoirs that have been hewn in the rock; rain falls very frequently. The temperature is at times very low; during our stay the thermometer showed in the middle of May only 50° Fahr. before sunrise; during the day it rose to 68°. The table-land of Dhâla' must be about 6000 feet above the sea. The Turkish troops suffered much from the cold and from the frequent rains. Kaukabân is garrisoned by about 200 Turkish troops; the walls, gates, and many of the houses show that the bombardment was well sustained; the fire seems to have been principally directed on the palatial residences of the Imâms of Sana'â. About a quarter of a mile from the town, on ground commanding it, one sees the trenches and parallels of the Turks; 700 Turks who perished during the siege lie in an adjoining field. The cemetery of the town is without the walls, the graves are marked with upright tombstones, but without epitaphs; the same fact struck us at the cemeteries of Sana'â and Wâdi-Thaur.

A ride of 6 miles over stony ground intersected by ravines brings one to the head of a valley, which lower down is called Wâdi-Lâ'ah. The descent is very steep. Almost immediately the face of nature changes. The air is warm and laden with the perfume of flowers; the hill-sides are covered with under-wood; aloes, euphorbias, oleander, geraniums, labiatæ, ferns, mosses, &c., grow luxuriantly; instead of vultures, one hears and sees many a songster—in short, after wild, bleak, and stony deserts, one is again in Araby the Blest.

Jâbal-Miswar bounds the opposite side of the valley, the road to Tawilah being carried along one of the spurs of Jâbal-Dhâla'. Tawilah is a walled town with fortresses on three of the seven basaltic masses, which rise to the height of 50 to

200 feet above the town. It was in former days a stronghold of the skaikhs of Kaukabân. The town overlooks a portion of Wâdi-Lâa'h, and we could see on the slopes coffee-plantations and several villages. Looking south one sees range after range of mountains running from east to west. Jâbal-Burâah in the distance, then Harâz, al-Khainah, Sarâ, Hâfash, and Milhân. We next rode to Rujûm, 15 miles distant from Tawilah, and several hundred feet lower. The country is well cultivated, the sides of the hills being terraced with stone walls wherever there is earth. The fields are ploughed with oxen, which are humped like the zebu of India. Thousands of cattle have perished in consequence of a murrain, which for the last eight years has committed dreadful ravages throughout the hill-districts of Yemen.

Rujûm is a walled town built on a basaltic rock that rises above a marshy plain; twice a week a market is held in the plain. 15 miles from Rujûm is Muhwit, a walled town with a Turkish garrison. The Jewish quarter is below the town. The climate, from the position of the town on the slope of a mountain, is cool. A spring of water in the neighbourhood is led into a few tanks, which the natives use for bathing. A bath in the cold spring-water of Muhwit is supposed to cure a number of diseases. It was recommended to us for intermittent fever.

It had been our intention on leaving Muhwit to ascend the eastern slope of Jâbal-Hâfash, make a halt at Safakain, a Turkish military station, descend the western slope to Rubûa'ah, and thence to Bâjil. We might have seen many coffee-plantations, the culture of kaat, *Celastrus edulis* (a plant whose young shoots are extensively chewed throughout Yemen, in the same way and with the same advantages as the natives of Peru use the coca-plant), besides much that is interesting; but we were so weakened by a fever caught at Rujûm, that we chose the easier route to Bâjil. After a long and steep descent we came to Wâdi-Mûhdirah, through which flows a stream of water teeming with fish, very like trout. This stream rises in Jâbal-Hâfash, and flows in a southerly direction; in some parts it is bordered with stately trees, and there are also a few coffee-plantations. Leaving the stream and passing the village of Sarâ we halted at Ghaffâf, and on the following day rode to another market-village called Sûku-'l-Juma'ah, at the foot of Jâbal-Sarâ, with Jâbal-Hâfash to the west.

The valley between the two mountains is called Wâdi-Ghaffâf, and it extends for some 15 miles in a south-westerly direction, till it joins the Wâdi-Hârrah, at Suku-'l-Khamis. It is well wooded with tamarisk, hennah, nabuk, tamarind, and acacia

trees, and there are many fields of *dhoura* and *dúhn*. We were now in the hot valleys bordering on the *Tihâmah*. The natives were no longer the pure Arabs of the mountain districts, but a mongrel race, of an olive complexion, some of them with woolly hair or thick lips; their Arabic differs much from that spoken by the pure Arabs, containing as it does many foreign words. The inhabitants of the *Tihâmah* belong to the same race. They are somewhat despised by the Arabs. The women when out of doors wear hats like those worn by Welsh women, made of palm-leaves, and some of the men wear helmets made of the same material.

Just before reaching *Sûku'l-Khamis* we forded a considerable stream, the *Sardûd*. We were told that it rises at the foot of *Jâbal Nâbi-Shâib*, flows through one of the gorges in the *Hâraz* mountains, called *Wâdi-Bishah*, next along *Wâdi-Hârrah*, and then along *Wâdi-Sardûd*. It drains the watershed of *Nâbi-Shâib*, *Hâraz*, *al-Khaimah*, and *Jâbal-Sarâ*, and other mountains, and contains in consequence a large body of water. From *Khamis* we went to *Hamrâ* along *Wâdi-Sardûd*. The first half is a narrow winding gorge shut in by granite mountains. The bed of the stream is so narrow that one is obliged to ford the water many times; after heavy rains the stream is so broad and violent, that communications with *Hamrâ* become impossible. At the second half one emerges from the hills and reaches a plain bounded to the north by *Jâbal-Hâfash*, but chiefly by *Jâbal-Milhân*. From *Hamrâ* the river flows west through alluvial soil, till it reaches the *Tihâmah* at a village called *Zhûbah*; after the summer rain it sometimes flows to the sea to the north of *al-Hudaidah*. Leaving *Hamrâ* and the *Sardûd*, we went due south through *Wâdi-'Azzân* to *Bâjil*, a distance of 12 miles. From *Bâjil* we revisited *Kuttây* and *Marâwah* in the *Tihâmah*. This village has a large market twice a week, at which mangoes, bananas, *kât*, *dhurrah*, milk, and the produce of the neighbouring hills are sold; besides rice, tumbak, spices, &c., which are brought from *al-Hudaidah*. A Sayyid resides at *Marâwah*, who is held in such esteem that people come from long distances to converse with him. The Turks honour him so much that the village of *Marâwah* is exempted from all taxes. A four-hours' ride brought us back to *al-Hudaidah* again. Thus from the uplands of *Sana'â* and *Kaukabân*, the zone of cereals, we had passed to the zone of coffee, and thence to the tropical lowlands and *Tihâmah*, the zone of *dhurrah*, cotton, and date-trees, and from that to the desert shores of the Red Sea.

ROUTE FROM AL-HUDAIDAH TO SANĀĀ.

As written by Niebuhr. S. P. B.		Hours.	Miles.
Hodeida	al-Hudaidah ..	..	..
Marāna	Marāwah ..	4½	13½
Kataja	Kuttāy	2	6
	Bājil	4½	13½
	Bohāy	2½	7
	Ubbāl	4	12
Sanfūr	Sanfūr	6	16
	Baitu-'sh-Shaikh	1½	4
Sehān	Sāham	4	12
Mōfhak	Mifhāk	5	13
	Hauthain ..	2	4
Boān	Buān	4	8
Mōttene	Māṭhna	2	6
Sanā	Sanā	5	14
		47	128

RETURN ROUTE FROM SANĀĀ TO AL-HUDAIDAH.

Sanā	Sanā .. ..	..	..
Rōdda	Raudhah ..	1½	4½
	Wādī-Thaur ..	2	6
Schibām	Shibām	7	18
Kaukebān	Kaukebān ..	1	*
Taufle	Tawilah	6½	17
Bed-sjum	Rujūm	6	15
Mehaulied	Muhwit	5	13
	Ghaffāf	5	13
	Sūku-'l-Jum'ah	5	13
	Sūku-'l-Khamis	4	12
	Hamrā	4	11
	'Azzān	1½	5
	Bājil	2	6
Kataja	Kuttāy	4½	13½
Marāna	Marāwah ..	2	6
Hodeida	al-Hudaidah ..	4½	13½
		60	166½

* 800 feet above.

VIII.—*Railroad and Steam Communication in Southern Peru.*

By CLEMENTS R. MARKHAM, C.B., F.R.S., Secretary R.G.S.

[Read, March 9th, 1874.]

THE central region of the Peruvian Andes presents an aspect very different from that to the south and on the Bolivian frontier. In the centre the space between the Maritime and Eastern Cordillera is comparatively narrow; it is broken up into deep, worn valleys and profound ravines, where wheat, maize, and even sugar-cane, are grown in the different zones of elevation. But the southern part of the Peruvian Andes and the northern portion of Bolivia present a very different character. From the Vilcañota knot, the Andes separate into two distinct chains, namely, the Maritime Cordillera and the Eastern Andes, which includes the loftiest peaks in America. The region between these two ranges contains the great lake of Titicaca, and consists of elevated plains intersected by rivers flowing into the lake, at a height never less than 12,000 feet above the sea. It is usually called the Collao, from one of the tribes which occupied it in ancient times. The surrounding mountains contain inexhaustible stores of copper and silver, the plains afford pasture for large flocks of alpacas, while the inner slopes of the Eastern Andes produce the best Peruvian bark, coffee, cocoa, coca, arnotto, and are watered by streams containing gold-dust in large quantities.

It has long been an aspiration of the best Peruvian statesmen to see all this wealth borne over Lake Titicaca by steamers, and across the frozen plains of the Maritime Cordillera by some more expeditious means than is afforded by the backs of llamas and mules. Nearly thirty years ago Don Manuel Costas, the present Vice-President of Peru, made an attempt to place a small steamer on the lake. He foresaw that, if this could once be done, a most important trade would spring up; which would give fresh life to the people of this classic land. All the products of the Bolivian forests—timber, chinchona-bark, chocolate, coffee, coca, fruit and arnotto—would be conveyed to Puno; and European manufactured goods, the aguardiente of the coast valleys, and the sugar of Abancoy, would be sent in exchange to the Bolivian ports. There would also be a brisk trade in wool, silver, and copper, and a traffic in provisions of all kinds between the Indian villages near the shores of the lake. Timber in vast quantities might be felled and sawn in the forests of Carabaya, and floated down the rivers during the rainy season, which, with the coal on the island of Loto, would furnish supplies of fuel. A railroad across the Andes, connecting the steam navigation of the Titicaca Lake with the ports of the

Pacific, was a stupendous undertaking which, even 15 years ago, was scarcely dreamed of by the most enthusiastic speculator. Yet the whole of these schemes have not only been undertaken, but are now completed and actually in working order.

The railroad from the port of Mollendo to Arequipa has been completed some years. Mr. Meiggs accepted a contract to construct a railroad across the Andes, from Arequipa to Puno, for 32,000,000 soles (6,400,000*l.*), or 29,500*l.* a mile. The cost of transport, labour, materials, and provisions was, of course, enormous. The distance from Arequipa to the shores of Lake Titicaca is 217 miles, and the works were commenced on June 7th, 1870.

After leaving the city of Arequipa the line crosses the River Chilé by a superb viaduct 1505 feet in length and 70 feet above the river-bed; and there are three other viaducts of equal magnitude, all constructed in the United States, and conveyed to their sites with infinite difficulty. Embankments of various heights, from 50 to 500 feet, are numerous, and, in some cases, the rough and steep slopes are overcome by reverse tangents. In one place there is a cutting, 84 feet deep, on the side of a precipice, with the roadway 1000 feet in perpendicular height above the valley. The longest tunnel is only 300 feet from mouth to mouth. Extraordinary difficulties had to be overcome, as may well be supposed when the inaccessible nature of the country is considered, the long distances without water, the heavy snowstorms, the absence of roads, and the intense cold of the loftier portion. From Arequipa to the baths of Yuva, a distance of 17 miles, there is no water, and up to this point the costly expedient was adopted of conveying it to the works on mule-back. The same thing was necessary from Caniaquas for 25 miles. From 4000 to 5000 labourers, chiefly Chilians and Bolivians, have been constantly employed during three years and a half, and on the 1st of January, 1874, the first locomotive reached the shores of Lake Titicaca. The highest point on the old road from Arequipa to Puno is 15,590 feet above the sea, and that of the line selected for the railway cannot have been much less.

Meanwhile active steps have been taken to establish steam navigation on Lake Titicaca. In 1861 the Peruvian Government ordered two screw steamers in London (20 tons, 40 H.P.), called the *Yavari* and *Yapura*, which were sent out to the port of Arica, thence to Tacna by rail, and, finally, the pieces were carried across the Andes on the backs of mules to Puno. But several pieces were lost, and the project remained in abeyance until 1868, when Captain Melgar, of the Peruvian Navy, was appointed to put together and launch the steamers. He set to

work with zeal and energy. Those who have crossed the Andes, and seen the total absence of all resources at Puno, can form an idea of the difficulties that have been overcome by Don Manuel Melgar. He had to build a factory and a stone mole, and to bring up all the workmen and materials from the coast, the lake being 12,000 feet above the sea. The *Yavari* was launched in June, 1871, and the *Yapura* on the 19th of March, 1872.

Their presence on these inland waters, together with the railway, will revolutionise the commerce of the surrounding provinces, knit the people of Peru and Bolivia together by common interests, and put new life into the inhabitants of the shores of Titicaca, the sacred lake of the Yncas. Markets and rapid means of communication having been secured, the trade of this region may be expected to increase rapidly on all sides. The face of the country will be entirely changed; the people, finding new wants, will become more civilised, and Puno, instead of a town with empty, silent streets and half-a-dozen reed *balsas* at its anchorage, will soon be a flourishing and busy port. When I was there, now nearly 14 years ago, these prospects seemed far distant. But now, thanks to the energy of the Peruvian Government, and of the great contractor Mr. Mciggs, they seem to be close at hand.

The cause of geography will be wonderfully advanced by these undertakings. At present there is no complete survey of the basin of Lake Titicaca, which, in some important respects, possesses special geographical interest. Lake Titicaca covers a superficial area of about 2500 square miles, being 100 miles long by 35 wide, and the surface is 12,196 feet above the sea. It is divided into two parts by the peninsula of Copacabana, the south division being 8 leagues long by 7, and united to the larger portion by the Strait of Tiquina. A number of rivers, which are swollen and of considerable volume during the rainy season, flow into the lake; and the water is carried off by the drain or *Desaguadero*, which, after a course of 160 miles, empties into the salt lake and swamps of Pavia or Aullagas.

The *Desaguadero*, connecting Lake Titicaca with the Aullagas, is a very remarkable feature. At this great elevation land vegetation is stunted and scanty, but in the waters of the lake there are acres of tall rushes. The constant east winds blow all the dead rushes to the western side, where they mix with the living beds and form a dense tangled mass. Out of them flows the drain, with the surplus waters of the lake, and so, by a channel 160 miles long, connects Titicaca with the salt swamps of Aullagas. Dávalos y Figueroa, a native of the country, who wrote in 1601, even speaks of the whole as one lake,

saying that in one part, where it is called the Desaguadero, or drain, it becomes very narrow.

These features cannot fail to remind the Meeting of the interesting discussion, in which Sir Samuel Baker took part on January 26th, on the subject of the supposed connection between the African lakes Tanganyika and Albert Nyanza. The surface waters of Titicaca, like those of Tanganyika, are fresh; and, in Sir Samuel Baker's view, Tanganyika is connected with the Albert Nyanza, which is at the same level, by a channel analogous to the Desaguadero, flowing from Titicaca to the Aullagas swamp.

The Aullagas, which is the final receptacle of all the drainage of the Titicaca basin, is of course utterly unlike the Albert Nyanza, because it has no outlet and is surrounded by Cordilleras of the Andes. It is salt, but it has always been doubted whether the large volume of surplus water flowing along the Desaguadero can be disposed of by evaporation alone. Cieza de Leon, an accurate and trustworthy old soldier, who was in Peru shortly after the conquest, and wrote in 1553, mentions a report that, in some of the coast valleys of Tarapaca, there were streams which were believed to be the waters of Lake Aullagas, opening for themselves a way through the bowels of the earth. In his recent exhaustive report of the Tamarugal plains, in the Tarapaca province, Don Miguel Valle Riestra suggests a similar explanation, namely, that the waters of Titicaca, after draining into the Aullagas Lake, find their way by filtration to the lower level of the Tamarugal.

I have referred to these points in order to indicate how much there is of real geographical importance and interest which still awaits investigation in the region now at last brought within easy reach of the sea-coast by railroad. A thorough survey of the great lake of Titicaca, and of its whole drainage area, is still a desideratum. Pentland went round the lake and fixed numerous positions, many years ago, but his was only a route survey; and D'Orbigny mapped the southern shores of the lake. When I first crossed this region, my duty obliged me to follow very much in the track of Pentland; and my latitudes and hypsometrical observations agreed satisfactorily with his, my heights being a few hundred feet less. But in returning, as soon as I went off Pentland's track, I came upon new features. Among these is the lake of Arafá, north of Titicaca, which is not on Pentland's map, though it is mentioned by Castelnau. Captain Melgar, the introducer of steam navigation on Lake Titicaca, has made a survey of the coast from Puno to Juli, and also confirms the accuracy of Pentland's observations for latitude. He has carefully examined the islands on the lake, especially

that of Titicaca, the beautiful sacred island of the later Yncas, where artificial terraces, full of flowers, rise from the water's edge, tier above tier, to the hill-tops, irrigated by channels drawn from the royal bath. All these classic spots around the sacred lake will now be explored and correctly mapped; and we shall at last get an accurate knowledge of this, the most interesting region, next to the Cuzco Valley, in all South America.

The valleys and wide forest-covered plains to the east of the Andes, in Carabaya and Bolivia, will also be explored. Beyond the work done by Don Antonio Raimondi and by myself, the vast and rich province of Carabaya is, so far as accurate geographical data are concerned, unmapped and unknown. Its wealth is enormous and inexhaustible. Its rivers diverge to the point in the vast South American wilderness where Colonel Church is so ably and resolutely working to complete a railroad round the rapids of the Madeira. Its more complete exploration will be a memorable geographical feat.

Now that the Peruvian Government has provided the means of rapid communication from the coast to the interior, its enlightened President, Don Manuel Pardo, has resolved to invite European explorers to judge for themselves of the resources of the ancient empire of the Yncas. An important decree was issued at Lima on January 13, 1874, enumerating the lines of railway that are now actually open, as well as those in progress.

1. From the port of Ylo to Moquegua.
2. From the port of Mollendo, by Arequipa, to Puno.
3. From Pisco to Yca.
4. From Callao to San Mateo (on the way to Oroya).
5. From Chimbote to Taquilpon.
6. From Pacasmayo to La Viña (on the way to Caxamarca).

The decree announces that, as the districts traversed by these railways abound in mineral wealth, it is desirable to bring to the notice of European enterprise the character and extent of the riches to be found within the territory of Peru, and the means of communication which place these riches within the reach of private enterprise. With this object, lithographed plans of the Peruvian railroads, accompanied by sketches of the most prominent engineering works on them, and brief descriptions, are to be published in English, French, and German. Collections of samples of the principal minerals and coal found in the districts traversed by the railroads are also to be made in triplicate, by Don Antonio Raimondi, the State Geologist, and placed on exhibition in London, Paris, and Berlin.

The Fellows of this Society will heartily applaud the action thus taken by the Peruvian Government; for not only will it

at once supply us with a large amount of new geographical information, but, it will tend, in its results, to the mapping and exploration of regions now little known, but which yield to none in the world in interest and importance; whether we regard their physical structure, the magnificence of their scenery, the grand scale on which nature has worked within their limits, or their inexhaustible riches.

IX.—*Notes of a Journey in the Island of Yezo in 1873; and on the Progress of Geography in Japan.* By R. G. WATSON, late *Chargé d'Affaires* in Japan.

[Read, March 23rd, 1874.]

IN the course of last summer I had an opportunity of passing six weeks in the island of Yezo, the most northerly of the three chief islands of Japan, and of making a journey of about 300 miles in the interior. As the route I passed over is included in that of Captain Blakiston, a detailed description of which was read before this Society in 1872, I should not have thought of inviting your attention so soon again to Yezo, but for the marked changes which have occurred in that island, and the discoveries which have been made there since the date of Captain Blakiston's journey. To an account of these changes and discoveries I shall mainly confine my remarks. Yezo, though one of the three main islands of Japan, is placed on a different footing from that of all the other portions of the Mikado's dominions which lie to the south of it. It is considered rather to be a colonial possession, and its entire administration is placed in the hands of a distinct office, called the Yezo Colonization Department, which has its head-quarters at Tokei or Yedo, and the Chief of which is likewise the Governor-General of Yezo. Although the island of Yezo may, perhaps, be somewhat larger than Ireland, the number of its inhabitants, as estimated by the Japanese authorities, does not exceed 124,000, of which number about 16,000 is assigned to the Ainos or aboriginal population of Yezo and the islands adjoining it to the north. Of these islands, that of Saghalien has of late years been to some degree colonised by Russia, as being to a great extent uninhabited land, although a portion of that island has been always claimed by Japan and is still occupied by Japanese. It was probably the colonisation of a part of Saghalien by a foreign Power, and the fear of the plea of non-occupation being likewise set up in favour of the occupa-

tion of a portion of Yezo, which induced the Japanese Government some three years ago to concert an extensive scheme, with the object of opening up this island and colonising it from the central and southern districts of Japan. Accordingly the Japanese representative in the United States was instructed to enter into engagements with a number of American scientific officers, who arrived in Japan two years ago and were placed at the disposal of the Yezo Colonisation Department. The chief of this mission, General Capron, at once set about the task of developing the resources of that island. He established at Yedo three model farms, and took measures for obtaining stock, seeds, grasses, and plants from America, with the object of their being introduced into the northern island of Japan.

In the spring of 1872 he and the gentlemen with him proceeded to Hakodate and began to explore the island which was to be the scene of their operations. Previously to their arrival the Japanese authorities had established the future seat of government of Yezo at a locality called Saporu, distant about 140 miles from Hakodate, and about 20 from Utarunai, the nearest port on the Western coast. At this spot a town, covering about a mile square, has sprung up within the last three years, and an excellent road has been constructed by American engineers connecting it with either coast.

The first section of this road extends from Hakodate to Mori, on Volcano Bay, and is 30 miles in length. There then occurs a break in the continuity of the road, and at Mori one has the choice of going round the bay to Endermo, some 60 miles, by the old Japanese mountain-path, or of crossing the bay in a junk or open boat, or by the steamer which plies twice a month either way across. Of the country between Hakodate and Mori I need not give a detailed description, as I find it has already been described in the 'Journal' of this Society by Captain Forbes, R.N. I would only remark that the cuttings which have been necessitated for the construction of the new road have afforded much insight into the geological formation of the region. The country for many miles is overlaid with several ranges of pumice which has been from time to time thrown out by the overhanging volcano of Homogataki. The relative depth of the layers of pumice affords the means of arriving approximately at the respective dates of the successive eruptions of the volcano. At some points of the cutting there are from five to six inches of mould above the latest stratum of pumice, below which again there are some 18 inches of mould, and then another substratum of pumice.

The last eruption of the volcano is said to have occurred eighteen years since, and therefore it may be inferred, assuming

the correctness of this date, that there was a previous eruption about sixty years before. From this it will be perceived that Yezo enjoys no exemption from the volcanic influences which make themselves so often and so markedly felt in other regions of Japan.

Opposite to the village of Mori, on the further side of Volcano Bay (which is about 20 miles in breadth), is situated the admirable harbour of Edomo, or Endermo, or Moraran, one of the finest natural harbours which could be anywhere met with. From the entrance to the innermost point is a distance of about 7 miles, and in the middle of the entrance is a small island, which, were it fortified, would completely command the approach to the harbour. As Endermo possesses such manifest natural advantages, and is, moreover, situated on the mainland of Yezo (Hakodate being on a tongue), it seems somewhat singular that the Japanese Government, in framing their scheme for opening up the island, should have overlooked the facilities which would be afforded towards the realisation of that scheme, by transferring to Endermo the seat of the local government, which is now at Hakodate, and by opening the former port to foreign commerce. Endermo is equally accessible with Hakodate from Yedo and Yokohama, and were shipping to go there direct a manifest economy would be effected to persons engaged in trading transactions, in the saving of the 30 miles of land-passage from Hakodate to Mori, and in avoiding the conveyance of goods across Volcano Bay. These considerations are so manifest that, should Yezo ever become settled to any considerable extent, Endermo must of necessity supersede Hakodate. At Endermo the road to Sapporo recommences, and continues to that place, first along the coast for 45 miles, and then in an almost direct line through the forest which covers the hills for a similar distance. The entire distance lies through a region clothed with the richest vegetation, the neighbouring hills being covered with splendid forests, containing trees of the most serviceable varieties—the oak, maple, walnut, birch, and pine being prominent amongst them, whilst the geniality of the climate is attested by the presence of the magnolia and other trees, natives of southern or tropical countries. This contrast of trees forms, indeed, one of the most marked features in Japanese scenery. Everyone who has passed through the Inland Sea must have been struck by the unusual combination of pines and cedars on the one hand, with palm-trees and bamboos on the other. To the right of the first half of this road from Endermo, and lying between it and the Pacific Ocean, are a number of the Ainos' villages, all more or less counterparts of each other. The houses or huts, which are covered

over with straw on the walls as well as on the roofs, are ranged round a square, on one side of which there is a large oil-pressing house, from which the dried fish is taken to be exposed in the adjoining square when the oil has been extracted. The fish (sardines), after having been dried in the sun, is exported to serve as manure. An Aino village is almost invariably built on the sea-shore, and in each village there is an elevated look-out post, perched on strong poles, from which the approach of a shoal of fish may be discerned. There is also another lower look-out in the village, from which warning may be given of the approach of bears. Each Aino hut has but one outer door and no windows, but there is a hole in the roof to admit of the escape of smoke. The hut is divided into two compartments, the inner being larger than the outer one, and being piled round with fuel, dried fish, and utensils for cooking, &c. The Ainos' food is fish, roots, and venison. There is in each hut a loom, and on the whole the interior presents more appearance of comfort than one would expect from the rough appearance of the Ainos themselves. The women carry the children strapped on their backs, the front of the strap passing over the mother's forehead. The women wear their hair cut short at the back of the neck, and their upper and lower lips are tattooed and stained in imitation of moustaches. The married women do not adopt the Japanese married women's custom of blackening the teeth. The Ainos have a very peculiar mode of equitation, balancing themselves on the horse's bare back, their legs dangling on a level with his neck. They are well-grown men, with good features, and an immense quantity of coarse black hair covering nearly all parts of the person. The men wear coats of bark.

The origin of the Aino race, which, like other wild races, is said to be fast disappearing, is a disputed question. Japanese records prove them to have at one time inhabited districts as far southwards as Yedo, and they are known to have even recently existed in considerable numbers in the province of Sendai; but now they are confined to Yezo, Saghalien, and the Kurile Islands. M. Goskavitch, formerly Russian Consul-General at Hakodate, the Abbé Mermet, and M. Sindau, have devoted much attention to this subject, but the absence of any Aino written language reduces its investigation almost to conjecture. They are a remarkably strong race and are individually very courageous, though collectively in abject terror of the Japanese. Their language is mellifluous, and their manners are gentle towards strangers, abject to Japanese officials. Though formerly oppressed, they have been better treated since the revolution of 1868. They worship the sun and the idea of

a Japanese power which means merely force: they likewise adore their ancestors. They have no idea of computation, and refer dates to certain events, such as the catching of a whale or the advent of a great shoal of fish.

The Ainos have not escaped the attention of the Japanese Government, in their efforts towards the reconstruction of all things throughout the empire. The scheme as affecting the Ainos is said to provide that they shall be civilised by Japanese wives. There is in the Yezo Colonisation Department a school at which 50 Japanese girls (daughters of officials) are being educated at the public expense by Dutch instructresses. These girls are, I was told at the school, destined to be the wives of Ainos. This is—supposing the scheme to be carried out—as if a number of girls were to be taken from a London ladies' school, and sent to be married to Gaelic-speaking Celts of Connemara. It is to be regretted that up to the present time no foreigner should have undertaken the task of mastering the Ainos' language, but it may be hoped that ere long one or other of our Japanese scholars will turn his attention to a study which could not fail to throw much light on the comparative philology of that region of the world.

The road from Endermo to Sapporo leads over several considerable streams, at which one may have excellent fly-fishing, and some idea of the amount of game which sportsmen would find in Yezo may be gathered from the fact that 30,000 pairs of deers' horns are each year exported from Hakodate. From the point at which the road leaves the sea-coast it leads, through continuous vegetation, to Sapporo, the traveller at one time passing through miles clothed with lily-of-the-valley, and at another through fields of wild roses in bloom. The town of Sapporo, being built entirely of wood, presents a much more finished appearance than a town of such recent date could present under other circumstances. It is connected by a small canal with the Ishikari River, which is 15 miles distant.

The main industry now apparent in Sapporo is the preparation of wood, two steam sawmills being constantly in operation under American superintendence. The forests of Yezo constitute one of the chief sources of the wealth which might be obtained from the island. It is estimated that, by a total outlay on setting up machinery of about 5000*l.*, there might be prepared daily in these forests a quantity of timber worth about 250*l.*, or 78,000*l.* worth in the working year of 312 days, less the cost of working the machinery for ten hours daily; and the above figures might be doubled were the machinery worked by two relays of men in the twenty-four hours. According to the estimates which result from inquiries instituted by General Capron,

one average acre of Yezo forest may contain about 42,500 feet of planking. It will thus be seen that a grant, say of 1000 acres, would afford the elements of very considerable profits; and when it is considered that these profits extend over an area perhaps equivalent nearly to that of Ireland, it will be seen what an extensive resource the Japanese Government possess at their command in the forests of Yezo alone. I may add that, whilst this source of wealth continues undeveloped, timber of qualities similar to that found in Yezo is being each year imported into Japan from Oregon, and elsewhere in the United States, over a distance of between 5000 and 6000 miles. Timber, of qualities which might be procured in Yezo, is likewise being constantly brought from the United States to Hong-kong. The natural development of its forests is perhaps the most obvious, but it is by no means the sole, source of the wealth which might be produced in Yezo. I travelled for some short distance up the Ishikari River, and then proceeded down the river to its mouth, where I had an opportunity of seeing the establishments there, connected with the salmon and other fisheries. Salmon and other fish are caught in the rivers and on the coasts of Yezo in enormous abundance. Salmon is there so cheap as scarcely to have a price, according to our idea of the word; and I was told by an English merchant of Hakodate that, were the fisheries of Yezo open to foreign enterprise, tins of prepared salmon, which would now sell in London for about 9d., might be placed in London for about 2½d. per tin. As it is, the fisheries of Yezo, as at present managed on behalf of the Japanese Government, although they even now supply a great portion of the revenue derived from the island, afford but a very small proportion of the revenue which under better management ought to be extracted from them. The revenue system adopted is that the Government receive one fish in so many, and, in order to ensure that the Government should receive its due proportion of fish, there is employed at the fisheries a host of Government officials. As one of the American officers expressed it to me, in answer to my inquiries, "Sir, there's an official for every fish caught."

In addition to its forests and fisheries, Yezo possesses a source of future wealth in its mineral productions. I had an opportunity of travelling on the Ishikari River with Mr. Lyman, the geologist of General Capron's Mission, and who was formerly employed by the Government of India in surveying the Punjab in search of petroleum. He informed me that he had found in different parts of Yezo traces of silver and lead, manganese, iron-pyrites, iron-sand, copper, zinc, rock-oil, and gypsum, as well as sulphur in abundance. By far the most

important mineral production of Yezo, however, consists in its fields of coal. As the mines of Iwanai have been described by Captain Blakiston, I need not go over the same ground. Mr. Lyman, at the time I met him (in July last), seemed to think it probable that these coal-fields might be found to contain, perhaps, 3,000,000 tons in each layer, there being six transverse layers. I was also informed, subsequently to my leaving Yezo, that Mr. Lyman had lately discovered vast fields of coal on or near the Ishikari River. The Yezo coal, though not of the finest description, is perfectly serviceable for steaming purposes, and were these coal-fields thrown open to the general markets of the world, there can be little doubt that, from their accessible situation, their produce would be in great request, and would, whilst affording large returns to Japan, greatly cheapen the price of coal on Eastern seas.

It may naturally be asked why, if such be the resources of Yezo, are they not turned to immediate practical account? I shall endeavour to explain the political conditions which overrule the commercial interests of the island. Yezo is, in common with the rest of Japan, a closed land to all foreigners beyond what are known as the Treaty Limits, that is to say, beyond a distance of 30 miles from Hakodate, which is the only open port in Yezo; so that, until the restriction on the free admission of foreigners into the interior be removed, foreign independent enterprise and capital must alike be excluded from everywhere but the one open port—a state of things which is the more to be regretted on account of the existing management of the island. It would be easy to cite numerous instances which came under my own observation, as well as many more which were repeated to me, showing how money may be thrown away; but one instance will serve as a sample of many. The Japanese administrators in Yezo, with other branches of the foreign civilisation which they have adopted, have not overlooked the custom of giving out contracts to persons who may have the means of making themselves believed in by men in power. It is on this hypothesis alone that I can explain the existence of four admirable breakwaters which I saw: one at Mori, on Volcano Bay; and three near the mouth of the Ishikari River. The one at Mori, which I paced, is 500 yards in length, and is said to have cost the Government 80,000 dollars, yet at the extreme end of this pier the depth of water is only 7 feet, so that not even a junk, far less a steamer, can, even in the most favourable state of the tide, be brought alongside it to be loaded. For all practical purposes the pier might as well have been constructed in the interior of the country. The three piers on the Ishikari River afford even a more striking example of mis-

management, to say the least. Near the mouth of the river in question there is on one side of the stream a depth of from 70 to 80 feet of water, whilst at the other side the depth for some distance from the shore does not exceed from 7 to 10 feet, yet the piers are on the shallow side of the stream. The restrictive policy of the Japanese Government with regard to foreigners—which is applicable to Yezo as to the rest of Japan—is not now, at any rate, dictated by any antipathy to foreigners, but solely by the reluctance of the Japanese Government to extend beyond its present limits the extra-territorial jurisdiction which treaty powers exercise over their respective subjects or citizens throughout the dominions of the Mikado. The Japanese Government has announced its willingness to admit foreigners freely into all parts of Japan on the sole condition that, whilst beyond the present treaty limits, they are to be subject to Japanese jurisdiction; but this condition the Treaty Powers have not accepted. It may reasonably be hoped, however, that ere long some compromise will be arrived at which, while it will save the susceptibilities of the Japanese Government, will at the same time afford the Treaty Powers a sufficient guarantee for the full protection of the persons and property of their respective subjects throughout the interior of Japan. Whenever the period arrives that shall see Yezo opened to foreign colonisation, I should imagine that its excellent climate and great resources would attract to it a fair share of European immigration. Its climate, though considered by the Japanese to be too rigorous, is admitted by Europeans to be excellent. Throughout the month of June last, and up to the 4th of July, I was glad to sit over a fire even at noon, and to sleep under a thick quilt at night. The Japanese are so averse to subjecting themselves to what they call the rigour of the Yezo winter, that many thousands of fishermen, labourers, and others, who come to Yezo from other islands for the summer months, quit it for their homes on the approach of winter; but winter, in an island which produces rice, hemp, and maize, would scarcely seem formidable to Europeans.

The entire island of Yezo is now being surveyed under the direction of Mr. Wassen, one of General Capron's officers. I visited his field establishment at Yubutz, and he informed me that he hoped that by the end of the present year (1874) his operations would be so far advanced as to admit of his laying down accurately the more prominent points of Yezo, and framing for the first time a correct outline map of the island. His labours will, no doubt, in due time be appreciated by this Society. I returned from Saporu, or rather from the mouth of the Ishikari River, to Hakodate by the western coast, passing several

considerable ports, in one of which, Utarunai, I counted 102 junks. The coast for a great distance is faced with abrupt rocky cliffs, and nothing could be more delightful than the scenery. The road above the cliffs winds over undulating grassy ground, the forest being everywhere visible at a short distance in the interior, and the villages are so numerous as to make it difficult to believe that the Japanese authorities do not greatly under-estimate the population of the island. I presume that the explanation of the low figure at which it is stated is, that the inhabitants of these villages quit them for the adjoining island on the approach of winter, and are not included in the census of Yezo.

The coast of the island of Yezo has within the last three years been surveyed by Captain St. John, of Her Majesty's ship *Sylvia*. The western coast of Yezo, and more particularly the neighbourhood of Matsumai, has an interest of its own, as having been the scene of the captivity and wanderings of Captain Golownin, of the Russian navy, whose narrative of his captivity in Japan during the years 1811, 1812, 1813, affords, I think, in a greater degree than almost any other work a comprehensive insight into the manners of the Japanese and into their former governmental system. The work of Captain Golownin is unique of its kind, owing to the very peculiar circumstances under which it was written, in affording information drawn at first hand, and not by hearsay, of Japanese manners and customs. Captain Golownin, whilst on a surveying cruise in the Northern Japanese waters, was treacherously taken prisoner by the Governor of Kunashier, on account of some depredations which had previously been committed on Japanese soil by another Russian naval officer. Captain Golownin and the three officers who had been seized along with him were detained for twenty-six months at various places in captivity, and it is most surprising that, under the very strict and constant surveillance to which he was subjected, he should have found the means of registering the notes forming the basis of his highly-interesting narrative. It affords alike an evidence of the amiability inherent in the Japanese character and of the candid disposition of Captain Golownin in that, notwithstanding the treacherous circumstances which attended his capture, he should express himself in terms of so much admiration of the Japanese and of their institutions.

Having now concluded my remarks on the island of Yezo, I will submit a few observations on the subject of geographical progress in the empire of Japan in general. The Japanese Government are fully alive to the utility of having the whole

of the Mikado's dominions accurately surveyed by duly qualified scientific officers, and for this purpose they last year sent to England their chief surveyor, Mr. Macvane, who was instructed to engage the necessary officers and to procure the requisite instruments. How far Mr. Macvane may have proceeded in his arrangements I have no means of knowing, as he had not returned to Japan at the date of my departure in December last. Previously to his leaving Yedo he had been engaged in preparing a survey of that city, which work in his absence is now being carried on by the subordinate English officers of the same department.

I have already mentioned that the coasts of Yezo have been surveyed by Her Majesty's ship *Sylvia*, and I should add that other portions of the Japanese waters, more particularly of the Inland Sea, have likewise been surveyed by British or French surveying vessels. As the Japanese Government have recently engaged the services of Commander Douglas, R.N., with forty-five other officers, petty-officers, and seamen of the Royal Navy, as instructors in the Naval College at Yedo, and have established at that place a hydrographical department, it may be hoped that, ere long, the Japanese will be perfectly competent themselves to undertake the survey of such portions of their coasts as may not have already been accurately laid down on charts.

Apart from scientific geographical explorations properly so called, there has of late years been in Japan an immense progress in general acquaintance on the part of foreigners with all regions of the country. Although the rule as originally framed is still in operation, by which no foreigners, with the exception of ministers and their suites, are permitted to travel in any part of Japan outside the Treaty limits, yet, owing to a variety of circumstances, foreigners of one or other nationality have in fact visited nearly every province of the Mikado's dominions.

Her Majesty's first minister in Japan, Sir Rutherford Alcock, whose valuable notes of travel throughout a very large portion of the country are included in the 'Journal' of this Society, was the pioneer amongst modern explorers of that empire. Her Majesty's present minister, Sir Harry Parkes, has likewise travelled across the country, and visited all the most important localities in it. The late minister of the United States, Mr. De Long, travelled from a point on the main island opposite to Hakodate, overland to Yedo, a distance of some 500 miles.

In August 1867, Messrs. Mitford and Satow travelled across country from Nanao, a harbour of the Prince of Kaga, on the western coast, to Osaka, on the eastern. They passed through the rich provinces of Kaga, Echizen—famous for silk and

cutlery, the province of Ii Kamon no Kami, and the country about Kioto. This journey was performed without any escort, these gentlemen throwing themselves on the hospitality of the Daimios through whose dominions they passed, written receipts for their persons being required and delivered at each frontier post.

Probably no one has travelled more in the interior of Japan than Dr. Willis, formerly physician to her Majesty's Legation, and whose journeys have always been undertaken from motives of charity. In the years 1868-69, he made a journey under peculiarly difficult circumstances, in the depth of winter, in order to attend the wounded troops at Wakamatsu, the capital of the rebel Prince of Aizu, in the north of the main island, which was then being besieged by the imperial troops. Amongst the foremost Japanese travellers should be named Mr. Aston and Mr. Wirgman.

The journeys of Mr. Adams are included in the records of this Society, and two gentlemen of her Majesty's Legation, Messrs. Lawrence and Satow, have been the first Europeans to travel over and describe the mountain-road (the *Nakasendo*) between Yedo and Kioto, the southern capital; the *Tokaido*, or sea-coast road between the two capitals, having been previously explored. Mr. Lawrence's description of the *Nakasendo* route is likewise in the possession of this Society.

The most famous mountains of the country have been, one after the other, ascended by our countrymen: the peak, second in fame to Fuzi Yama alone having been last year climbed and measured by Mr. Lawrence. The results of many of these expeditions are now chronicled in the 'Journal of the Asiatic Society of Japan,' which Society was founded about twenty months ago, and their comparison will no doubt in due time lead to the furtherance of the knowledge of the geography of the country. The Japanese Government have in their employment a very considerable number of foreigners, and an exception is made in the case of these gentlemen to the rule which prohibits foreigners in general from travelling in the interior of the country. The result is that a large amount of scientific and general information has been acquired through them respecting the interior of Japan. A survey, for instance, has been made of the line of country lying between Osaka and Kioto, and of that between Lake Biwa and Tsuruga, on the western coast, and likewise an inspection by Mr. Boyle, C.S.I., the chief engineer, of the route from Kioto to Yedo; all of these being with a view to the construction of railways between these places, respectively. From what I have said, I think it may be inferred, that even should the present policy of con-

fining foreigners in general within the Treaty limits be persisted in, there are fair grounds for hoping that ere long the scientific world will be in possession of the fullest geographical information of the Islands of Japan—an empire which so recent a writer as Dean Swift coupled with the visionary regions of Lilliput and Brobdingnag. There can be no doubt, however, that geographical discovery in Japan would be greatly accelerated were the country freely thrown open to foreign travellers, and the date at which it will be so is, I think I may say, merely a question of a few months more or less.

Meanwhile, such foreigners as may have the privilege of travelling in any part of the interior of the country meet with the utmost possible cordiality and good-will. All obstruction in the way of the circulation of foreigners throughout the country proceeds from the Government, and by no means from the Japanese people. The state of things which I describe with reference to the mutual relations between Japanese and foreigners, is so opposite to that which notoriously existed between them but a very few years ago, that persons whose experience of Japan may not be of so recent a date as my own, may have some difficulty in realising that my description is not over-coloured.

Facts, however, speak for themselves, and from one or two which I may mention, I think you will draw but one conclusion. When I arrived at Yedo, in May 1872, I found at Her Majesty's Legation a Japanese mounted escort for our protection, of forty-three men; and wherever any of us went, on foot or on horse-back, in the city of Yedo, or within a distance of many miles around it, we could never, unless when in-doors, escape the surveillance of these guards, whose lives, had anything happened to us, would have been forfeit for ours.

Being convinced that the anti-foreign feeling which had called for such measures of precaution in the case of members of a foreign Legation had almost entirely passed away, I readily met the Japanese Government in a proposal that these guards should be withdrawn; and within two months of my arrival at Yedo they were so. From that time onwards I was in the habit of going about Yedo in all directions, at any hour from dawn till midnight, having no person whatsoever with me, excepting a groom to hold my horse or to carry a lantern, if at night. I slept, in summer, in a room with windows and doors open. I never carried a stick or whip for defence, and never once had my revolver loaded.

I have visited all of the seven Treaty ports, viz.: Yedo, Yokohama, Hiogo, Osaka, Nagasaki, Niigata, and Hakodate; and have further visited the southern capital, Kioto, and like-

wise made a journey to the Tombs of the Tycoons at Nikko, in addition to excursions in the neighbourhood of Yedo, and I may say that in no country in the world in which I have travelled—in Asia, Europe, or America—have I, wherever I went, been received with such unmistakable and invariable welcome; whilst I never, under any circumstances, was subjected to a single unpleasant look or word.

Nor is this experience my own alone. I had ample opportunities whilst in Japan of conversing with, or hearing from, or of, such foreigners as were permitted to travel in the interior of the country; and so far as I know, the experience of one and all, during the last two years, entirely coincided with my own. Nor, I apprehend, is it in the least degree probable that the present existing feeling of cordiality towards foreigners is of a transient or ephemeral character. Such a supposition may be at once rebutted by a reference to the statistical fact that there are now under instruction some 430,000 Japanese on the Western system of education, whilst the number of youths who are receiving instruction on the formerly adopted Chinese system number only some 300 in the entire city of Yedo.

The rising generation are being taught to sit on chairs, to write at benches, thoroughly to understand English, and to master the various branches of Western education.

Such being the case, it may, I think, fairly be assumed that the interior of Japan will not long remain a region into which foreigners are forbidden to enter. Many persons seem to consider that the progress of new ideas and the adoption of Western customs amongst the Japanese has been so unprecedentedly rapid, that it therefore cannot be lasting; but, whilst it must be admitted that the history of the world furnishes no parallel to the recent civil revolution in Japan, it should, I think, be at the same time allowed that it would be contrary to the lessons of history to expect that an empire, which has adopted such institutions as those which Japan now possesses under a central government, should revert to the feudal system.

For my own part, in so far as I may be capable of forming an opinion, I entertain no apprehension whatsoever regarding the stability of the present order of things in Japan. However rapid may have been the progress onwards, that progress has been continuous. Although the manners and customs, the laws and institutions, of an ancient people, may not be changed in a year, or in a decade, there has still, since the adoption of Western civilisation was decided on, been a continuous advance towards the goal in view; and popular sentiment seems to go hand-in-hand with the progressive statesmen of the country,—with one instance of which feeling I may bring this paper to a

conclusion. As is well known, it has during many centuries been the custom that Japanese nobles and gentlemen should, whilst beyond the precincts of their houses, carry on their persons the two swords which were the badges of their rank. This custom, indeed, on the part of these privileged classes, had become so ingrained in the ideas of the entire inhabitants, that the Government, at a very recent period, expressed themselves as believing, that were any order to be issued which should prohibit the carrying of swords, such an order might cause a revolution. Accordingly no order on the subject was issued, but the compromise was subsequently tried of issuing a Government notification to the effect that for the future the nobles and the *Samurai* need not, unless by their own preference, continue to wear their swords.

The result was that in an almost inconceivably short space of time the usage of wearing swords was abandoned, and it is now almost as unusual to meet in Yedo a Japanese wearing the old two swords, as it is to meet a gentleman in London attired in the Highland costume. Indeed, last year when the senior Prince of Satsuma, who is at the head of the small anti-foreign party in Japan, visited Yedo, with a large retinue of followers, their now almost obsolete custom of carrying swords afforded so constant a source of ridicule, as these Satsuma men passed through the streets, that they soon found it convenient to keep within doors. Their Prince, though still preserving his antipathy to the intruders from the West, has established, at Kagoshima, a medical school for the instruction of Japanese youths by two foreign doctors, engaged by the Prince of Satsuma; thus showing that even the head of the anti-foreign party himself recognises the fact that, however unwelcome to the ex-Daimos, of which he is the representative, the new order of things in Japan must be accepted as being inevitable.

X.—*Narrative of a Visit to the Kuh-i-Khwajah in Sistan.*

By Major BERESFORD LOVETT.

IN March, 1872, I proceeded from our camp at Banjar, near Nasirabad, the chief city of Sistan, to visit a remarkable isolated hill to the west, called the Kuh-i-Khwajah. It is so called because Pir Khwajah, a holy dervish who existed I do not know how long ago, is said to be buried there; and it is renowned in the history of Sistan as having been the place of refuge of many of the famous heroes that figure in the historic annals of that country. I started from Nasirabad, where I had called to obtain a guide

and to collect an escort, about 4 P.M., and arrived about one hour after dark at the village of Dadeh. I was not able therefore, to notice much about the details of the country intervening between Nasirabad and Dadeh, a tract of about 10 miles in a straight line. I ascertained, however, to my cost and to the disgust of servants and escort, that the irrigation canals near Dadeh were not only numerous but deep.

Dadeh I found to be a village of the usual mole-hill order, a congeries of vaulted hovels with holes at top for the escape of the smoke, with one or two square-built houses of greater pretension, with flat timber roofs and wooden doors. I was shown into one of the latter by the chief of the escort, a Persian from Kain, one of the most remarkably glib "farceurs" (not to use a stronger term) that I ever met. I, however, on hygienic grounds, declined the proffered accommodation and had a bell-tent pitched outside the village, and there passed the night. We had no difficulty in procuring all that was necessary for man and beast.

The next morning early I arose and made a sketch of the Kuh-i-Khwajah. The morning then, at that early hour, was tolerably clear; and the hill viewed thus close (we were not more distant than about 5 miles) was very remarkable. Owing to the haze, which even thus early was slowly rising, I could not see far down the sides of the hills on the western side of the desert.

Our mendacious "chief d'escort" having now collected a sufficiency of guides and provisions from the villagers, for which he paid his own price, but for which he charged me according to a different tariff, now stated he was ready; so off I started, accompanied by the Khed-Khoda, or headman of Dadeh, who rode a very fine powerful Turkoman mare, which took him over the irrigation cuts in a very nimble manner. He told me he was obliged, about ten days after the Nao-roz, or the vernal equinox, to stable her in a perfectly dark stable, and cover her up completely in clothes, legs and all, and this because of the horse-flies, which in Sistan are very numerous and venomous, and make it peculiarly hazardous to keep horses. These flies feed, as grubs, on a saccharine gum that exudes from a dwarf tamarisk which abounds in the valley of the lower Helmund.

We passed through cultivated country for several miles, and, on nearing the margin of the lake-area, we noticed that what remained of tamarisk-jungle was being rapidly cleared previous to ploughing. It appears that of late years, owing to the paucity of rainfall in the basin of the Harud, Ferah Rud, and the Helmund, the size of the annual inundations of the Sistan lake-area has much diminished, and yearly the waters have receded, till

this year (1872) access to the Kuh-i-Khwajah is effected entirely on dry land; whereas Conolly, my solitary European predecessor, in 1842, when he visited this island, was conveyed there on a raft from the mainland, and through lanes cut and kept clear in the Naizar, or reed-field, intervening between the island and the mainland.

Now, however, cultivation has advanced to within two miles or so of the island: in fact, has been developed, *pari passu* with the retreat of the waters, which has been assigned as the cause; whereas it is due more to the fact that the comparatively civilised and strong rule of Persia has of late years supplanted internal anarchy or Afghan misgovernment, that these signs of prosperity have become manifest. The crops were principally corn. Irrigation canals, feeders from the main trunk-canal which passes the village of Chiling, were numerous; and, in all places where the road crossed, they were provided with frail wooden structures that served as bridges. Our friend the Khed-Khoda, on his big Turkoman, spurned the bridges and took his brooks in good style. As I had a chronometer in my pocket, I was prevented from doing the same. On the left of our road I perceived the tall tower of Chiling situated on the main canal that is led off from the Helmund. I also descried about eight other villages, each provided with its watch-tower. Their names, like small Persian villages generally, I found varied with the name of the then Khed-Khoda; so that Aliabad becomes in a few years Husainabad, and so on.

At Divaneh, the last village we passed to the west, and which we found to be a wretched little assemblage of reed-huts inhabited mostly by herdsmen, who pasture their cattle in the marshes of the lake-area, we engaged guides to lead us through the labyrinth of tamarisk-jungle that fringes the borders of the now dry lake-area which represents what is usually submerged.

Once through this brushwood, composed almost entirely of tamarisk-bushes, we emerged upon the clayey dry bed of the lake, a perfectly flat boundless plain as far as the eye could reach to the south-west and north; but the haze had by this time so much increased, that the western mountains on the other side of the lake-area were with difficulty discerned. This lake-area was dotted irregularly along its eastern shores with patches of tall reeds, which were then just gone to seed. The reeds were about 10 feet high, and stood very thick together. They are very useful to the Sistanis, serving them in their green state as pasture for cattle, and on arriving at maturity for various uses, such as for making rafts capable of bearing two or three persons, for thatching purposes, for mats, screens, sieves,

pipe-stems, &c.) Parts of this reed-field had been fired for the sake of the after-grass, and from these fires arose vast columns of smoke into the still air. These served as tolerable indications of the limits of the eastern shores of the lake-area, for a considerable way to the north of our path.

We found close to the island (if I may apply this term to the elevation we are considering) a large pond of somewhat brackish water, partly environing it on the eastern side. We were obliged, therefore, to make a *détour* round the north of this residual lake, and then we skirted the eastern cliffs of the Kuh-i-Khwajah till we reached its south-eastern extremity. The cliffs are steep and rugged, and have an altitude of, I suppose, about 220 feet. They were perfectly bare of vegetation except a few lichens. I remarked the *débris* at the base of the cliffs was not much water-worn, but preserved its angular sharpness and clean cleavage. I was able to recognise the fact that the water had risen, at some previous time, fully 10 to 12 feet above the general level of the clayey bed at the base of the cliffs.

When we reached the south-eastern extremity of the island, we found we had arrived at the base of a most interesting ruined fortress, or village tower, as I suppose, by comparison with existing villages in Sistan, I should term it. These ruins were those of Kuleh Kahgah, which was constructed apparently in terraces up the steep face of the cliff. The walls composing these ruins are of rubble-masonry, being the stone composing the rock set with mud-plaster; and, judging from the proportion of some of the remains, it is evident there existed formerly several large buildings in the town. One, in which we took up our temporary quarters, afforded ample space to our men and horses, and consisted of a courtyard surrounded by various large and small rooms; but access to this yard was rather difficult, and the devious path passed over the vaulted roofs of the buildings of the lower terraces. One of these vaults—dome-shaped arches of about 10 feet diameter—whilst one of our horses was going over it, suddenly collapsed, and the unfortunate animal (who luckily was then riderless) was precipitated into the chamber below, performing a half-turn in his transit, as he came down on his back and his legs sticking up in the air. We rescued him with difficulty, and were rejoiced to find him uninjured, having escaped with a few scratches.

On clambering up to the top or plateau of the island, we found it gently undulating, devoid of vegetation, except a few stunted bushes. The rock-formation of the island, geologically, is basalt. It has a dark colour, slightly crystalline fracture, and has a jointed structure running north-west and south-east; in that respect exhibiting the same general axis of disposition that

the mountain chain to the west possesses. The island evidently belongs to the same formation geologically as these mountains, and is one of the numerous hills of like shape and structure which exist on the eastern side of this lofty chain, which separates the Great Desert of Persia from the basin of the Helmund. There are, for instance, the Manja Kuh, the Kuh Kuch, and another island-hill, north of the Koh Siab, to the west of the citadel of Lash. The only peculiarity of this hill is its being thrown out so far in advance, at about 30 miles of the main chain.

A further peculiarity about the Kuh-i-Khwajah is that the gorge in the south of the island has been formed by the denudation of a mass of red marl that occupied this gorge, and the remains of which still cap the subjacent basalt.

On the top of the island there are a great number of tombs. That of the Holy Man, or Pir, from which the island derives its appellation, is situated at the northern extremity close to the cliffs. The tomb is profusely ornamented with rosaries of the seeds of the Binneh-tree and of other beads, and votive offerings of variegated pebbles of quartz and jasper, disposed in patterns on the top of the sarcophagus. This is placed in a domed building, the four corners of which are ornamented with the long spiral horns of the mar-khor, or wild goat—a mode of embellishment very prevalent in Eastern Persia and in Afghanistan.

From the top of the dome, which stood about 25 feet from the ground, and which formed a convenient station for our surveying instrument, the whole expanse of Sistan to the east is visible; but, owing to the haze, objects were very indistinct. I was obliged, in fact, to remain on the island till quite late in the afternoon, when the setting sun shone on the villages dotting the plain below, and thus enabled us to secure sights on the various objects I required to observe. To the north-west also I was equally unfortunate as regards the atmosphere, and could not discern the Pillar of Nadir, supposed to have been erected by that monarch as a beacon for travellers traversing these inhospitable wild expanses to or from Bandan, where the principal road from the interior debouches. From information furnished by a Persian officer, who surveyed this route, it appears this pillar is about 16 to 18 miles distant north-west from the Kuh-i-Khwajah. The existence of this pillar tends to show that periods of the dryness of this lake-area are recurrent, and probably it was during one of these, like the present one (1871-72), that this pillar was erected,—eminently useful as a landmark in these expanses, where it is frequently impossible in the day time to "orienter" oneself unless provided with a magnetic compass. When crossing the desert between Bám and the mountains to its north-west, we passed two such pillars. They

were built of brick, about 150 feet high, with an interior spiral staircase, and I dare say this one is constructed on the same model.

Between the tomb of Pir-Khwajāh and the ruins of Kaleh-Kahgah, which we have described, is a distance of about 1000 yards, with a path running nearly in a straight line, having on its easterly side a number of graves, arranged in rows. Many of them are in disrepair, and the contents exposed. I searched in vain for any inscriptions worth copying, or for any encaustic tiles or bricks, which I had been led to expect to find in profusion, from the descriptions of Sistan in M. Ferrier's interesting, though slightly speculative, record of travels. The tombs are built of common sun-dried brick or rubble, simply plastered over with mud. They were intended to lie all with their feet to the kibleh of Mecca, so that at the Resurrection the entombed may arise with their faces towards that shrine; but the tombs, as indeed also most of the musjids of Eastern Persia, as far as my observations led me to conclude, are several degrees out of the correct direction. To the right of the path above mentioned I noticed a large tank, constructed of large squared stone. It was dry; but was formerly evidently used by the inhabitants of Kaleh-Kuhgah as a reservoir. There are at present no inhabitants on this island, not even a "mutawali," or guardian for the shrine.

On the south-west extremity of the island, across the gorge, and situated on the edge of a perpendicular cliff, are ruins now known as those of the Kaleh Chel Kinji, or the Castle of the Forty Maidens. It seemed at the distance to be of white stone (probably it was built of mud), and overlooks another fort at its feet, lying about a quarter of a mile from the base of the island, and, I suppose, during the floods isolated from it. Till lately I believe this latter was garrisoned. I asked the *chef d'escorte* what legends about these ruins there might be, and without the slightest hesitation, like a true son of Iran, he invented a suitable story out of his inner consciousness. It was to the effect that in days of yore forty maidens were locked up by a Div in this castle, and treated very cruelly; however, a good Peri, or fairy, delivered them out of his hands, and transformed them into doves, and the Div and his imps into the Sistan lies, "which are with us unto this day," added my informant, triumphantly, as an unanswerable proof of the truth of his romance. Later in the afternoon I left this island, and returned to the mainland by a more south-easterly route than the one by which I had come. I put up for the night at the village of Lutf Allah, and the next morning I went on to Dadeh, and proceeded thence back again towards Nasirabad, and on to Banjar,

to rejoin the British Commissioner's camp. I had thus the opportunity of reconnoitering the route between Dadeh and Nasirabad, which, owing to the darkness, I had been unable to do on my setting out. The country between Dadeh and Nasirabad is singularly devoid of habitations, or even ruins. The hamlet called Burj-i-kerim was the only place I saw having a patch of cultivation about it. We crossed the watershed that exists between the land irrigated by the Kernandi Canal that waters Nasirabad, Banjar, &c., and the tract watered by the Chiling main canal and its subsidiary irrigation cuts, or "naoburs," as they are locally termed. This watershed, which runs north-west by south-east, is not so well pronounced as further south, where, accumulations of sand upon it give it a rise of 60 feet. I should suppose the basis of those sand-hills to be rocks of breccia and clay, such as are exposed at Kimuk, on the banks of the Trunk Canal, and which are repeated again more emphatically at Kaleh Fath on the Loyer Helmund. It is worthy of observation how the parallelism recognisable in the disposition of the main ridges of elevation in the mountain chain separating Sistan from the Great Desert of Persia, is persistent even in these subordinate axes of upheaval. The tract forming this water-parting, where we crossed it, was deeply furrowed by the north-westerly winds, of just such depth that I was prevented getting azimuth bearings of Chiling and Nazirabad simultaneously. The force of the wind, judging from its effects, is surprising, and I should have thought the furrows had been formed by the action of water, had I not been repeatedly assured that they were due solely to the vehemence of the prevailing winds. The stunted stature of the tamarisk-bushes and patches of dwarfed sandworts and wormwood, also testified to the credibility of the statement.

In conclusion, it is to be hoped that, under the present Government of Persia, which has evinced a desire for progress, steps may be taken, by a proper system of embankments, to prevent the annual encroachments of the lake waters, which might be utilised to an unlimited extent by a judicious and scientific system of embankments, canals, &c. There is no reason, speaking in an engineering point of view, why the waters of the Helmund and Farrah rivers, &c., might not be utilised to irrigate vast tracts of land, capable of supporting an industrious population, and of producing luxuriant crops of sugar, indigo, and cotton, as well as cereals of all kinds; whereas at present, with the exception of, I suppose, in Sistan, some 350 square miles, intermittently cultivated, the whole of the water of the Helmund, for instance, runs to waste into the lake-area. But the time when such works could be undertaken in that part of

the world is necessarily very remote, and I fear that the waters of the Sistan Lake will long continue to be only useful as a haunt for the innumerable wild-fowl which find a winter refuge in their reedy expanse.

*XI.—Narrative of an Expedition from Suakin to the Soudan, compiled from the Journal of the late Captain LANGHAM ROKEBY, R.M. By FRANCIS PARRY, F.R.G.S.**

CAPTAIN ROKEBY arrived in Cairo on the 14th July, 1870, and was delayed there upwards of four months arranging preliminaries for an expedition to restore and complete telegraphic communication between the Red Sea and the Nile. In company with Mr. Rolfe, he left Suez on the 25th October by the Egyptian steamer *Massowah*. It being the season of the Hadj, or pilgrimage, the English travellers suffered no small inconvenience from the crowded state of the boat; though provided with nautical instruments, the commander of the steamer left port without setting his chronometer, which had run down, and, discarding all ordinary seamanlike methods, navigated after the Arab manner, avoiding shallows and reefs by a close observation of the colour of the water, and where there were no hidden dangers making a course by a knowledge of the configuration of the coast. Touching at Gambo and Jeddah, Suakin was reached on the 4th November.

Suakin, situated on an island of about a mile and a half in circumference, with suburbs on the mainland, contains about 5000 inhabitants, and is a place of increasing importance as a commercial depôt. The adjacent country is a level expanse, bounded on the north and west by mountain ranges; extending southwards, the plain continues much of the same character all along the coast as far as Massowah, on the borders of Abyssinia. The rains, commencing in November, prevail until the close of February, during which time the lowlands exhibit an appearance of considerable verdure. Of late years cotton has been cultivated, the seed being inferior. The value of the fibre is about 43s. per canta of 112 lbs. purchased on the spot, or about 60s. delivered in Cairo. An attempt to carry the telegraph through the Soudan had been made in 1865, but the death of the two engineers employed in its construction effectually retarded the progress of the undertaking. Some idea of the arduous nature of the work may be formed, when it is stated that 8000 camels

* The accompanying section of Capt. Rokeby's map, from Suakin to Ra-sai, is the only one that has reached us.

perished during the progress of the expedition, which terminated so disastrously; the great loss of transport animals excited the animosity of the Arabs who supplied them, and led to the destruction of the line in places distant from military posts, followed by heavy reprisals in demands of compensation for the damage done. In one section, forty miles of wire with the poles had been thrown down.

On the 10th December, all being in readiness for the departure, the engineers had audience of the Governor and moved forward towards Kasâla with a caravan consisting of thirty-two camels and two donkeys, passing over a sandy plain covered with low bushes of mimosa and wait-a-bit thorn, intermingled with tufts of grass, affording good pasturage for numerous flocks and herds during the rainy season, when the country presents a pleasing aspect; becoming arid and burnt-up under the scorching heat of summer. The first halt was made at the foot of the hill of Too-com-brete, the summit of which is about 750 feet above the sea-level. Here hares abound, and the camp was well supplied with quail and partridge. From this point the view eastward is bounded by the sea, ten miles distant; westward, are the uplands and mountain ranges of Wah-ma, Water-ab, and Wantari, of an elevation varying from 2000 to 5000 feet. Onward, as far as the mound of Abi-gwab, the vegetation and the character of the ground are unchanged. The route then crosses the spurs of the hills; large boulder stones lie scattered in all directions, and watercourses in the ravines mark the passage of the torrents which render the road almost impassable during the strength of the rains. A wady larger than the rest was ascertained to be 276 yards in width, and appeared to have risen to eight feet. A gradual ascent is made from the plains to the higher land. On the slopes, many Bedouins were seen, some driving milk-laden donkeys to the Suakin market, others tending the browsing goats of the tribe, while away from the beaten track in the far distance, the aid of a field-glass brought to view numerous gazelles feeding in perfect security. The Flora of the district is described as not varied; in sheltered places the wild thyme is abundant.

Snakes, both harmless and venomous, are common in this district. One was seen engaged in a deadly contest with a lizard, each reptile instinctively using its powers as best it could. The lizard, being attacked, seized the snake by the head with a firm hold; the snake, however, coiling round its adversary, would probably have gained the victory, had not the approach of the caravan alarmed both the combatants, who made off with all speed, apparently none the worse.

The Arab treatment for a snake-bite is to cut out the wounded

part instantly, and then rub the new wound with the horn of a deer.

On the 28th December the camp moved to Saterab, taking up its position about a mile from a watercourse, which overflowing during heavy rains that occurred some days subsequently, gave evidence of the necessity of choosing high ground for the tents while uncertain weather prevailed. Heavy rains occasionally disturbed the working party; the Europeans sheltered under the bushes, the Arabs stripped off their clothing and sat upon it until the rain ceased. Tents were provided for the two Englishmen; for the soldiers and Arabs no shelter was provided, even at night.

From Saterab, or Wah-ger, an advance was made to Maize, 54½ miles from Suakin. The route, westerly and almost parallel with the mountains of Ouda, crosses a small ridge at Boor, entering upon a plateau. The sea is no longer visible, but to the east the barren hills of Tara-ban-tail appear, with others of the same chain.

Halting near the western range called Mount Maize an extensive view was obtained southward over the vast table-land, covered with low bushes, bounded by the mountains of Shab-ba. The rising ground to the west is the haunt of robbers, travellers are therefore careful to keep their cattle together; notwithstanding the adoption of precautionary measures, some of the sheep were taken during the night. A party of soldiers followed the track into the hills, recovered the lost sheep, extorting a fine in kind, an act of summary justice.

Some of the followers having on more than one occasion made free with the contents of the master's cooking-pot, leaving nothing for the next repast, the simple expedient of having a piece of bacon added to the general boil, deterred the Mahomedans from appeasing their appetite with what did not belong to them.

The aspect of the country is without material variation as far as Shankerat. This point is 1500 feet above the sea-level, and the highest ground traversed since leaving Suakin. A gradual descent now commences towards Hassasam, through an arid and barren district.

At the last-mentioned place, the first doum-palm on this route was seen. The fruit is slightly sweet, but insipid and woody; it forms, however, a staple article of food among the Bedouins, and is, in fact, a substitute for bread, with, probably, more nourishment, as many of the Arabs employed by the engineers had no other food for a month, except milk and a little Indian corn.

With regard to the periodicity of the rains, about four months is stated to be the time of their duration. Commencing at

Kasâla, they extend to Wah-da-way, from the latter place to Shankerat, and from thence to Suakin, moving in three divisions. On arriving at Shankerat on the 6th January, having passed through much wet weather, the expedition found the rains had ceased; the days hot, with a prevailing strong north-east wind, producing a considerable fall in the temperature after sunset.

The water supply at Hassasam being insufficient, a speedy move was made to Caram-ra-bab, (800 feet) a rapid descent since leaving the crest of the ridge.

Approaching almost to contact, the hills here form a defile through which the north-east wind blew with great force, driving the sand in clouds through the pass, to settle in deep drifts on the other side. Surrounded by an uninteresting and barren country, Caram-ra-bab has the redeeming feature of possessing a reliable watercourse.

The approach to it is three miles from the main route, and following the ravine formed by the constant action of the stream during the rains, passing between high perpendicular rock chasms, in the deep shade of this solitude even in the dry season water is found in pools, apparently percolating from natural reservoirs in the overhanging sandstone. The sole tenants of this ravine are a few vultures.

Returning to the camel-track a caravan was seen approaching destined for Suakin, its freight a living one, for though not frequently met with, it was a slave dealer's company proceeding to the coast with negro girls for the Jeddah market. Their position on the camel's back seemed by no means secure, a platform made of a bed-frame was lashed firmly on the animal by cords, on either side of this two girls sat almost afraid to move lest the equilibrium should be destroyed; their costume was simple and suited to all weathers, it consisted of a necklace of beads, a pair of sandals, and nothing more.

The camp was struck on the 18th January. The camels and donkeys provided with water suffered from lack of pasture; the men, also, were reduced to a small allowance, having failed to obtain sheep *en route*: a bey having recently taken five cows for his soldiery without payment, the Arab flocks had been withdrawn to the mountains. Shortly after departure, a dreary waste was traversed, volcanic in appearance and strewn with scoræ. To it succeeded the fording of the important stream of Lang-aib, which takes its course by Baraka into the Red Sea.

The winding waters of this stream, its banks overhung with the desert cypress, with the steep and lofty mountains of Anhib to the eastward, formed a prospect more pleasing than any observed since leaving the sea-coast.

A tract of unproductive sand lies between this and Wandī. Arrived at this place, comparative abundance gladdened the hearts of the hungry travellers. Flocks and herds grazed around, and a band of pilgrims bound from Gondokoro to Mecca, who had been twenty-five months on the road, were grouped about the wells sunk in the bed of the wady.

The Kasāla road now ascends, crossing the mountain at an altitude of 1500 feet, on approaching Ibll-age the high land of Abyssinia can be seen about 90 miles to the eastward. Many of the watercourses passed along the mountain route, have growing near them the much esteemed doum-palm.

On the 20th January the telegraph communication had been carried as far as Hamish-bil-ay, 141 miles from the point of departure. Situated in a valley this camp afforded a pleasing contrast to many left behind. Gazelles were numerous and to all appearance plump; on being killed not an atom of fat was found, nevertheless the venison was a welcome addition to the table. In this vicinity are several cemeteries of the Arab-villagers, the graves are seldom more than a foot deep marked by a heap of stones which is increased in proportion with the position the deceased held in the tribe. Very little demonstration is made on the occasion of a death, often only the bearers accompany the remains to their resting-place. Numerous ruins mark the site of a large village, which the Bedouins assert was occupied by Ali, son of the uncle of Mahommed, who drove out the Christian owners. One building, standing on the bank of the large watercourse of Wah-da-way, and conspicuous for its size, is said to be "the worshipping-place of the ancient Christians." The ruin having been quarried for the sake of the materials, little idea can be formed of its original proportions. The highest portion of the wall remaining is about twelve feet. The smaller buildings are some eighteen feet square, others circular in form, the only break in the wall being a doorway.

Leaving Hamish-bil-ay the route lies immediately at the base of deeply-fissured hills of sandstone. The summit of one called Om-ree, more prominent than its fellows, has been formed by the Arabs into a resemblance to the features of a man, distinguishable by the unaided sight at a distance of eight miles; the length of the face from the eye to the chin has been conjectured to be 100 feet in measurement.

At Teheen the tents were pitched for the night in the dry river-bed, the stillness of the evening giving fancied security from variable weather; but towards morning a violent wind blew from the mountains, upsetting all canvas shelter and creating considerable confusion.

Wah-ree-dee, the first station in the Kasâla district, was reached on the 11th February: a strong body of soldiers permanently occupying the ground in huts, with numerous cattle feeding in an unlimited pasture, gave the place the appearance of a settlement.

An incident here took place which will serve as an example of the peculiar temper and obstinacy of the camel. One had fallen, from the moist and slippery state of the ground, but having made one ineffectual effort to regain its feet, nothing would induce it to attempt to rise a second time, and refusing all food, it died on the spot, although uninjured.

Proceeding towards Rasai, the plain extends for an immense distance, forming the watershed supplying the streams which feed the rivers flowing to the Red Sea; and the Gash and Atbara tributaries to the Nile, which passes through the Egyptian delta into the Mediterranean. At Rasai excellent water was found, milk and honey plentiful, with oxen at the price of 6s. per head, and sheep in like proportion.

After some delays, which took the chief of the expedition to Suakin, telegraphic communication was opened to Kasâla. The first message was transmitted from the latter place on the 20th March, 1871, informing the Governor-General of Suakin that the Arabs of the tribe of Gadeen refused to pay the usual tribute.

On the morning of the 17th May, Mr. Rolfe died at Kasâla, after some weeks' illness, leaving Captain Rokeby to carry out the most arduous part of the undertaking—the extension of the line westward—without European assistance.

About a mile from Rasai, in the direction of Kasâla, the first view of the hill of Filik is obtained, a prominent feature in the landscape, 40 miles distant. For half the distance, or nearly a day's journey with camels, the way is over a sandy desert; a more fertile tract of country is then approached, with an alluvial soil sprinkled with thorn bushes, left untouched amid the growing crops. Indian corn, cotton, and tobacco thrive here, and the yield would be considerably increased if the ground was rid of wild bushes and properly tilled. The agricultural implements of the district are primitive; the plough has a wooden blade, is drawn by men, and does little more than scratch the surface of the ground.

The price of Indian corn is 8s. 4d. the ardeb, or about 1s. 8d. per bushel. Two descriptions of tobacco are produced, and are procurable from the growers at 1s. 1d. per pound for smoking, and 2½d. per pound for chewing, qualities.

Filik, situated on the River Gash, is a market town, and the head-quarters of Sheik Mousa, the chief of the Hadendowa

tribe; it has a population of 1000 inhabitants, dwelling in mud huts. Situated at the junction of the caravan routes to Suakin, on the Red Sea, and to Berber, numerous trains of camels pass, laden with grain for the Nile boats proceeding to Egypt, and with skins and ivory for vessels laden at the sea-coast.

The comparative fertility of this neighbourhood is due to the river which, below the town, disperses itself over the land. In the direction of Kasâla are large plantations of cypress, through which the caravan route is taken for many miles. During the hot season, the journey is usually performed at night, when some excitement is felt lest the pack animals fall a prey to leopards, tigers, and lions infesting the forests.

It was on the 31st May, nearly six months after starting with the expedition from Suakin, that Captain Rokeby arrived at Kasâla. This town, situated on the right bank of the Gash, is the chief place of the Taka province, and the residence of a governor, with a kadi or judge. It is surrounded with the defence of a mud wall, insufficient to guard against attack from the Arabs, but protecting against the incursions of the hyenas and wolves that prowl about the outskirts at night. The inhabitants are estimated at 5000 persons, debilitated by the universal miasmatic fevers prevalent after the rains. For twenty-nine months prior to the arrival of the expedition the mortality had been 592, or at the rate of 20.4 per month, the highest death-rate being 43, the lowest 8 per month.

Nothing can exceed the indifference shown to all sanitary arrangements. Filth and putrescence are thrown into the streets, and accumulate in the environs of the town, the hyenas and pariah dogs doing the duty of scavengers. The water supply is got from wells in the gardens, which are sunk to the depth of 18 to 26 feet; though ample in quantity, this supply is, probably, polluted by surface drainage. Irrigation from the wells is practised after the Indian manner, two bullocks working an endless band, running over a wheel, to which are attached earthen jars emptying into a trough at every revolution. The gardens are carefully cultivated, producing an abundance of vegetables, notably onions and garlic; and of fruits, the pine, lemon, orange, also the banana; this last named, however, is not plentiful, a bunch costing half a dollar, a single fruit a piastre, equal to 2½d.

Education is not entirely neglected, as three Mohammedan priests are in charge of schools, receiving a remuneration fixed by the Government. A resident medical inspector attends to the public health, receiving 37½ dollars per month, for which advice and medicines must be provided for all applicants, free of charge.

The Kadi receives the pay of 500 piastres a month; his powers of punishment are limited to the infliction of 80 lashes, or four days' imprisonment. There is, also, a mercantile assembly, with a presiding chairman, which regulates the transport charges on merchandise, and mercantile affairs generally.

The bed of the Gash is 400 yards wide opposite the town. This year (1871) the stream commenced to flow on the morning of the 27th June, to continue for three months. Rising in the interior of Abyssinia, the river divides about 10 miles from Kasâla, one branch taking the direction of Filik, the other a westerly course, spreading over a considerable tract of country before reaching Goz-regiab. To the north and west of the town, between it and the river, are the huts of the Bedouins, structures of a circular form, well-thatched and weather-proof, bearing favourable comparison with the inferior dwellings within the town walls. Of the tribes settled in this vicinity the "Halanya" take the precedence, having been the original holders of the land until subjected by Mahomet Ali in 1838. The "Daka-reeah" were once settled at Darfour, on the western bank of the Nile. The "Choukrieh" both grow grain and deal in it, bringing large quantities to Kasâla from Kedaref, a town distant about five days' march. The "Haden-dowa" are scattered throughout the district, the majority being inhabitants of the uplands. The "Galeen" speak pure Arabic, and trace their origin from Berber, on the Nile; in respect of their Arabic speech, they are distinguished from most of the tribes, as dialects are found with almost every division bearing a specific name. The "Renanis" occupy the belt of land along the sea-coast from Suakin to Massowah. The "Haden-dowa" is numerically superior to any other in the Soudan; it is divided into twenty sections, occupying territory from Cosseir to Kasâla, Suakin being its easternmost point—to the west approaching Berber. The names of the divisions of the tribe are:—

- | | |
|------------------|-------------------|
| 1. Gamel-ab. | 11. Gar-ecb. |
| 2. Tan-queer-ab. | 12. Imme-rab. |
| 3. Shar-ab. | 13. Hay-cor-tiab. |
| 4. Sha-aib. | 14. Mah-moor-dab. |
| 5. Har-quor-lab. | 15. Hadal-ab. |
| 6. Moor-ha-bab. | 16. Haleng-ab. |
| 7. Shar-af. | 17. Samer-ab. |
| 8. Comeel-ab. | 18. Han-see-lab. |
| 9. Well-eel-ab. | 19. Ham-dab. |
| 10. Amer-ab. | 20. Antee-gab. |

The tribute levied upon the Arabs of the Taka Provinces by the Egyptian Government is about £60,674 per annum. All

the tribes are Mahomedan, and are strict in carrying out the observances of their religion.

An approximate idea of the cost of cattle and provisions at Kasâla is given in the following list of prices :—

			Dollars	Dollars
			From 10	to 100 each
Camels	.. ..	..	100	300
Horses (of Dongola)	.. ..	..	8	40
" (of Abyssinia)	.. ..	..	3	8
Donkeys, pack animals	.. ..	..	10	80
" for the saddle	.. ..	..	5	10
Bullocks, two years old	.. ..	..	2	6
Cows	.. ..	..	2	..
Calves	.. ..	..	50c.	2
Sheep	.. ..	..	2	piastres = 5d
Figs	.. ..	..	5	paras
Eggs	.. ..	..

Salt is supplied from Jeddah, on the east coast of the Red Sea; the cost of its carriage into the interior renders it an exceedingly expensive luxury. The products collected here (at Kasâla), or in transit to Suakin, are skins, ivory, ostrich feathers, gum-arabic, cotton, tamarinds, simsim, and coffee, the latter from Abyssinia. During the rains the caravan route is heavy, and the fatigue of travelling greatly increased.

The slave trade does not flourish here, the annual incoming being not in excess of one hundred individuals, of a value of from 30 to 100 dollars each. It was stated that a considerable traffic existed at Massowah, slaves being taken to that place from the Soudan, Abyssinia, and the White Nile, to be despatched in dhows to Jeddah.

Berbera, in the Somali country, was also mentioned as a great slave mart. The general opinion amongst the native merchants was, that Sir Samuel Baker's mission would produce a temporary deterrent effect, but that the trade was so profitable that nothing less than a permanent occupation of the countries engaged in it by a military force would suppress it; and that, if interfered with on the Nile, the transport of slaves to the sea-coast with increased hardship would result.

From Caturea, a small village at the foot of the Kasâla mountains, an ascent was made in order to determine the character of the country lying to the eastward. Observations at the summit gave the elevation of 1250 feet above Caturea, and 3000 feet above the sea. The prospect extended over a vast plain, watered by the Gash; the River Atbara being seen at a distance of 40 miles. Signs of habitations were few, the native huts making no marked appearance in the landscape. Returning, the party experienced all the inconvenience of being drenched by the tropical rains, and with difficulty avoided in the darkness

